

**Douglass Gymnasium
Renovations**

Live Oak, Florida

BFBS

A R C H I T E C T S 

August 2025

Date Issued

Technical Specifications –

Project Phase – 100% Technical Specifications

Suwannee County Board of County
Commissioners

13150 Voyles Street
Live Oak, Florida 32060

TABLE OF CONTENTS

Douglass Gymnasium Renovation

Cover Page

Table of Contents

DIVISION 1 - GENERAL REQUIREMENTS

- 010000 - Summary
- 010270 - Application for Payment
- 010400 - Coordination
- 010900 - Definitions and Standards
- 012000 - Project Meetings
- 012100 - Procedures and Performances
- 013100 - Construction Schedule
- 013400 - Submittals
- 013700 - Schedule of Values
- 015100 - Temporary Utility Connections
- 016000 - Material and Equipment
- 017300 - Execution
- 017310 - Operation and Maintenance Data
- 017400 - Warranties and Bonds
- 017700 - Closeout Procedures

DIVISION 2 – EXISTING CONDITIONS

- 024119 - Selective Demolition

DIVISION 3 – CONCRETE

- 031000 - Concrete Formwork
- 032000 - Concrete Reinforcement
- 033000 - Cast in Place Concrete

DIVISION 4 – MASONRY

- 042000 - Unit Masonry

DIVISION 5 – METALS

- 051200 - Structural Steel Framing

DIVISION 6 – WOOD, PLASTICS AND COMPOSITES

- 061000 - Rough Carpentry
- 061053 - Miscellaneous Rough Carpentry
- 062013 - Exterior Finish Carpentry – As - Required

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

- 071326 - Self Adhering Sheet Waterproofing
- 072100 - Thermal Insulation
- 072119 - Foamed in Place Insulation
- 072500 - Weather Barriers
- 072726 - Fluid Applied Membrane Air Barriers
- 074113 - Standing Seam Metal Roof
- 076200 - Sheet Metal Flashing and Trim
- 077100 - Roof Specialties
- 079200 - Joint Sealants

DIVISION 9 - FINISHES

- 099113 - Exterior Painting
- 099123 - Interior Painting

DIVISION 10 - SPECIALTIES

- 104413 - Fire Extinguisher Cabinets
- 104416 - Fire Extinguishers

DIVISION 31 - EARTHWORK

- 312000 - Building Earthwork

SECTION 010000 - SUMMARY

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. Project information.
 - 2. Work covered by Contract Documents.
 - 3. Work by Owner.
 - 4. Access to site.
 - 5. Coordination with occupants.
 - 6. Work restrictions.
 - 7. Specification and drawing conventions.
 - 8. Miscellaneous provisions.

1.3 PROJECT INFORMATION

- A. Project Identification:
 - 1. Project Title and Location: Douglass Gymnasium Renovation project, located at 969 Douglas Street SW in Live Oak, Florida
- B. Owner: The Suwannee County Board of County Commissioners

Owner's Representative: Jason Furry - Assistant County Administrator

- C. Architect: Barnett Fronczak Barlowe & Shuler Architects, 2074 Centre Pointe Boulevard, Tallahassee, Florida, 32308.
- D. Architect's Consultants: The Architect has not retained the following design professionals who have prepared designated portions of the Contract Documents and/or Technical Specifications.
 - 1. Structural Engineering: Kever McKee
 - 2. Civil Engineering: Dewberry
 - 3. Landscape Architecture: NA
 - 4. Mechanical, Electrical, Fire Protection and Plumbing Engineer: Tomahawk
 - 5. Construction Manager: TBD.
 - a. Construction Manager for this Project is Project's constructor. The terms "Construction Manager" and "Contractor" are synonymous.

1.4 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Technical Specifications and consists of the following:

The work under this contract includes all labor, materials, equipment, supervision, and services necessary to complete the renovation of approximately 1,303 square feet of existing classroom space and associated MEP infrastructure upgrades at the Douglass Gymnasium located at 969 Douglas Street SW, Live Oak, Florida. The scope of work is limited to interior renovations, mechanical/electrical system improvements, and exterior mechanical yard sitework.

The project shall include, but is not necessarily limited to, the following major components:

Selective Demolition of interior finishes, non-load-bearing partitions, ceilings, mechanical equipment, lighting, and electrical components within the designated classroom area.

Architectural Renovation of two classrooms, including new gypsum board partitions, ceilings, flooring, doors, frames, and painting.

Mechanical System Upgrades, including new rooftop HVAC units, ductwork distribution, grilles/diffusers, and controls to serve the renovated areas.

Electrical Work including new lighting fixtures, power outlets, low-voltage raceways, and replacement of electrical panels and feeders as necessary.

Fire Alarm and Life Safety Integration in coordination with new and existing systems.

Exterior Mechanical Yard Construction, including the installation of equipment pads, protective fencing, and utility service connections for mechanical equipment.

1.5 Type of Contract:

1. Project will be constructed under a single prime contract.

1.6 WORK BY OWNER

- A. General: Cooperate fully with Owner so work may be carried out smoothly, without interfering with or delaying work under this Contract or work by Owner. Coordinate the Work of this Contract with work performed by Owner.

1.7 ACCESS TO SITE

- A. General: Contractor shall have use of Project site for construction operations as dictated on by the Owner and as indicated by requirements of the Owner Contractor Agreement.
- B. Use of Site: Project site to work in areas indicated by the Owner/Contractor agreement. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep driveways and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
 - a. Schedule deliveries to minimize use of driveways and entrances by construction operations.
 - b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.8 COORDINATION WITH OCCUPANTS

- A. Full Owner Occupancy: Owner will occupy site and adjacent building(s) during entire construction period. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's day-to-day operations. Maintain existing exits unless otherwise indicated.
 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and approval of authorities having jurisdiction.
 2. Notify Owner not less than 72 hours in advance of activities that will affect Owner's operations.
- B. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
 1. The Owner will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
 2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
 3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
 4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.

1.9 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
 1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

- B. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
 - 1. Notify Owner not less than two days in advance of proposed utility interruptions.
 - 2. Obtain Owner's written permission before proceeding with utility interruptions.
- C. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.
 - 1. Notify Owner not less than two days in advance of proposed disruptive operations.
 - 2. Obtain Owner's written permission before proceeding with disruptive operations.
- D. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.
- E. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- F. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
 - 1. Maintain list of approved screened personnel with Owner's representative.

1.10 SPECIFICATION AND DRAWING CONVENTIONS

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 010270 - APPLICATION FOR PAYMENT

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Procedures for preparation and submittal of Application for Payment.

1.2 RELATED REQUIREMENTS

- A. Bidding Conditions
- B. Contractual Conditions
- C. Section 013400 - Submittals: Submission Requirements
- D. Section 013700 - Schedule of Values
- E. Section 017000 - Contract Closeout: Final Application for Payment

1.3 FORMAT

- A. Application for Payment Form - AIA Standard G702.

1.4 PREPARATION OF APPLICATIONS

- A. Submit applications for payment to Architect in accordance with the schedule established by conditions of the Contract and agreement between Owner and Contractor.
 - 1. Type required information, or use media-driven printout.
 - 2. Execute certification by signature of authorized officer.
- B. Submit Schedule of Values for review and acceptance by the Architect/Engineer and Owner per Section 013700. Schedule of Values shall be broken down for each Work item and shall indicated both materials and labor.
- C. Use data on accepted Schedule of Values. Provide dollar value in each column for each line item for portion of Work performed.
- D. Initial progress payment shall not be made until Contractor has established a

Contractor's site office, with telephone service, and a temporary field office for the Project Representative.

- E. Prepare Application for Final Payment as specified in Section 017000.
- F. Submit Application for Payment in rough format (percentages complete) for Owner and Architect/Engineer review five (5) days prior to submittal of Application.

1.5 SUBMITTAL PROCEDURES

- A. Submit seven (7) copies of each Application for payment at times stipulated.
- B. Contractor shall submit to Architect/Engineer not later than the first working day of each month an application for payment completed and signed by the Contractor.

1.6 SUBSTANTIATING DATA

- A. When Architect/Engineer requires substantiating information, submit data justifying line item amounts in question.
- B. Submit suitable information for each copy of application with a cover letter identifying:
 - 1. Project
 - 2. Application number and date
 - 3. Detailed list of enclosures
- C. Submit one copy of data and cover letter for each copy of application.
- D. Submit with each copy of application continuation sheet providing the following:
 - 1. Fill in total list of all schedule component items of work, with item number and scheduled dollar values for each item.
 - 2. Fill in dollar value in each column for each schedule line item when work has been performed or materials stored.
 - 3. list each change order executed prior to date of submission, at the end of the continuation sheets.
- E. Submit data and applicable insurance as required by Owner to establish Owner's title to material and equipment suitably stored at the site.
 - 1. The Contractor shall be responsible for all expenses of the Architect/Engineer to verify the quantity of stored materials off of the site.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 010270

SECTION 010400 - COORDINATION

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Contractor shall supervise and direct the work competently and efficiently, devoting such attention thereto and applying such skills as may be necessary to perform the work in accordance with the Contract Documents.
- B. Contractor shall be solely responsible for all means, methods, techniques, sequences and procedures of construction, and for providing adequate safety precautions and coordinating all portions of the work under the Contract Documents.
- C. Contractor shall be responsible to see that the finished work complies accurately with the Contract Documents.
- D. Contractor shall be responsible for all project coordination.

1.2 RELATED REQUIREMENTS

- A. Bidding Conditions
- B. Contractual Requirements
- C. Section 012000 - Project Meetings
- D. Section 017000 - Contract Closeout

1.3 DESCRIPTION

- A. Coordinate scheduling, submittals, and work of the various sections of specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items to be installed later.
 - 1. Maintain reports and records at job site:
 - a. Daily log of progress of work and other pertinent data. Maintain log accessible to Owner, Architect/Engineer and his representative.
 - b. Assemble documentation for handling of any claims or disputes which may arise.
 - 2. Inspections and Testing:
 - a. Inspect the work to assure that it is performed in accordance with

- the requirements of the Contract Documents.
 - b. Arrange with the Architect/Engineer and/or owner as applicable for special inspections or testing required.
 - c. Reject work which does not conform to requirements of the Contract Documents.
- B. Coordinate sequence of work to ensure proposed completion dates are met.
 - 1. Construction Schedule:
 - a. Prepare detailed schedule of Contractor's operations and for all subcontractors on the project.
 - b. Monitor schedules as work progresses.
 - 1. Identify potential variances between scheduled and probable completion date.
 - 2. Recommend to Architect/Engineer any adjustments in schedule to meet required completion date.
 - 3. Provide monthly summary reports of each monitoring.
 - c. Observe work to monitor compliance with schedule.
 - 1. Verify that labor and equipment are adequate to meet and maintain the schedule for the work.
 - 2. Verify that product deliveries are adequate to meet and maintain the schedule for the work.
 - 3. Report any non-compliance to Architect/Engineer, with recommendations for remedy.
 - 4. Verify that adequate services are provided to comply with requirements for work and climatic conditions.
 - 5. Verify proper maintenance and operation of temporary facilities.
 - 6. Administer traffic and parking controls for construction workers. Construction traffic shall not interfere with surrounding traffic movement.
 - 2. Coordination of Subcontractors:
 - a. Coordinate work of all subcontractors and relationship between them.
 - b. Establish on-site lines of authority and communication. Schedule and conduct progress meetings among Owner and Architect/Engineer representatives and subcontractors.
 - c. Ensure that specified cleaning is done during progress of the work and at completion of contract.

1.4 MEETINGS

- a. In addition to progress meeting specified in Section 01200, hold coordination meetings and pre-installation conferences with personnel and subcontractors to assure coordination of work.

1.5 COORDINATION OF SUBMITTALS

- A. Schedule and coordinate submittals specified in Section 01340.
 - 1. Administer processing of shop drawings, product data, and samples.
- B. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
 - 1. Coordinate Testing Laboratory Services:
 - a. Notify laboratory of test schedule.
 - b. Verify that required personnel are present.
 - c. Verify that specified tests are made as scheduled.
 - d. Verify compliance of the test results with specified criteria. Determine need for retesting and submit recommendations to Architect/Engineer. Administer and pay for required retesting.
 - 2. Coordinate with Sub-contractors as required:
 - a. Provide temporary utilities (electric, water) required by the Subcontractors in the performance of their work.
 - b. Provide designated location where the Subcontractors may place construction debris for removal by the Contractor.
- C. Coordinate requests for changes to assure compatibility of space, of operating elements, and effect on work of other sections.
 - 1. Recommend necessary of desirable changes to Architect/Engineer.
 - 2. Review subcontractor's requests for changes and substitutions. Submit recommendations to Architect/Engineer.
 - 3. Process Change Orders in accord with General Conditions and Change Order Procedures.

1.6 COORDINATION OF SPACE

- A. Coordinate use of Project space and sequence of installation of subcontractor work which is indicated diagrammatically on Drawings. Follow routings shown for pipes, ducts, and conduits as closely as practicable, with due allowance for available physical space; make runs parallel with lines of building. Utilize space efficiently to maximize accessibility for other installations, for maintenance, and for repairs.

- B. In finished areas, except as otherwise shown, conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.

1.7 INTERPRETATION OF CONTRACT DOCUMENTS

- A. Consult with Architect/Engineer to obtain interpretation or clarifications for any portions of the contract documents which are unclear or ambiguous. Transmit all requests for interpretation in writing.
- B. Assist in the answering of any questions which may arise.
- C. Transmit written interpretations to Sub Contractors, Suppliers and Others who's work may be affected by the clarification.
- D. Interpretations shall be based on the Architect/Engineers review of the Contract Documents. In case of conflicting data, assumption shall be made that the item of greater quality, cost of quantity was bid.

1.8 START-UP

- A. Direct the check-out of utilities, operational systems, and equipment.
- B. Assist in initial start-up and testing.
- C. Record dates of the start of the operations of systems and equipment.
- D. Submit to Architect/Engineer written notice of the beginning of warranty period for equipment put into service.

1.9 COORDINATION OF CONTRACT CLOSEOUT

- A. Substantial Completion:
 - 1. Coordinate completion and cleanup of work of separate sections in preparation for Substantial Completion.
 - 2. Upon determination of Substantial Completion of work or portion thereof, prepare for the Architect/Engineer a list of incomplete or unsatisfactory items.
- B. Final Completion:
 - 1. Upon determination that work is at final completion:
 - a. Submit written notice to Architect/Engineer that the work is ready for final inspection.
 - b. Secure and transmit to Architect/Engineer required closeout

submittals.

2. Turn over to Architect/Engineer.
 - a. Operations and maintenance data.
 - b. Spare parts and maintenance materials.
 - c. Warranties and other data as required for these specifications.
 - d. Owner file copies of all submittals, changes, etc.
- C. After Owner occupancy of premises, coordinate access to site by various sections for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.
- D. Assemble and coordinate closeout submittals specified.

PART 2 - PRODUCTS

Not used

PART 3 - EXECUTION

Not used

END OF SECTION 010400

SECTION 010900 - DEFINITIONS AND STANDARDS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS:

- A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification sections, apply to work of this section.

1.2 DEFINITIONS:

- A. General Explanation: A substantial amount of specification language constitutes definitions for terms found in other Contract Documents, including drawings which must be recognized as diagrammatic in nature and not completely descriptive of requirements indicated thereon. Certain terms used on Contract Documents are defined generally in this article. Definitions and explanations of this section are not necessarily either complete or exclusive, but are general for the work to extent not stated more explicitly in another provision of Contract Documents.
- B. General Requirements: The provision or requirements of Division 1 section. General Requirements apply to entire work of contract and, where so indicated, to other elements which are included in project.
- C. Indicated: The term "indicated" is a cross reference to details, notes or schedules on drawings, to other paragraphs or schedules in the specifications, and to similar means of recording requirements in Contract Documents. Where terms such as "shown", "noted", "scheduled", and "specified" are used in lieu of "indicated", it is for purpose of helping reader locate cross-reference, and no limitation of location is intended except as specifically noted.
- D. Directed, Requested, etc.: Where not otherwise explained, terms such as "directed", "requested", "authorized", "selected", "approved", "required", "accepted", and "permitted" mean "directed by Architect/Engineer", "requested by Architect/Engineer", etc. However, no such implied meaning will be interpreted to extend Architect's/Engineer's responsibility into Contractor's area of construction supervision.
- E. Reviewed: Where used in conjunction with Architect's/Engineer's response to submittals, requests, applications, inquiries, reports and claims by Contractor, the meaning of term "reviewed" will be held to limitations of Architect's/Engineer's responsibilities and duties as specified in General and Supplementary Conditions. In no case will "review" by Architect/Engineer to be interpreted as a release of Contractor from responsibilities to fulfill requirements of Contract Documents.

- F. Project Site: The space available to Contractor for performance of the work, either exclusively or in conjunction with others performing other work as part of the project. The extent of project site is shown on the drawings, and may or may not be identical with description of land upon which project is to be built.
- G. Furnish: Except as otherwise defined in greater detail, term "furnish" is used to mean supply and deliver to project site, ready for unloading, unpacking, assembly, installation, etc., as applicable in each instance.
- H. Install: Except as otherwise defined in greater detail, the term "install" is used to describe operations at project site including unloading, storage, unpacking, assembly, erection, placing, anchoring, applying, work to dimension, finishing, curing, protecting, cleaning and similar operations, as applicable in each instance.
- I. Provide: Except as otherwise defined in greater detail, the term "provide" means furnish and install, complete and ready for intended use, as applicable in each instance.
- J. Installer: The entity (person or firm) engaged by Contractor or its subcontractor or subcontractor for performance of a particular unit or work at project site, including installation, erection, application and similar required operations. It is a general requirement that such entities (installers) be expert in operations they are engaged to perform.
- K. Testing Laboratory: An independent entity engaged to perform specific inspections or tests of the work, either at project site or elsewhere; and to report and (if required) interpret results of those inspections or tests.
- L. Owner Furnished - Contractor Installed: Equipment or components of a system that are purchased by the Owner and furnished to the Contractor for installation in the project. The Contractor shall receive, store, protect, install, connect and test each time unless otherwise indicated.
- M. Contractor Furnished - Contractor Installed: Equipment or components of a system that are purchased, furnished, and installed by the Contractor.
- N. Owner Furnished - Owner Installed: Equipment or components of a system that are purchased, furnished and installed by the Owner or his vendors.

1.3 FORMAT AND SPECIFICATION EXPLANATIONS:

- A. Specification Production: None of these explanations will be interpreted to modify substance of requirements. Portions of these specifications have been produced by Architect's/Engineer's standard methods of editing master specifications, and may contain minor deviations from traditional writing formats. Such deviations are a

normal result to this production technique, and no other meaning will be implied or permitted.

B. **Format Explanation:** The format of principal portions of these specifications can be described as follows; although other portions may not fully comply and no particular significance will be attached to such compliance or noncompliance.

1. **Sections and Divisions:** For convenience, basic unit of specification text is a "section", each unit of which is named and numbered. These are organized into related families of sections, and various families of sections are organized into "divisions", which are recognized as the present industry consensus on uniform organization and sequencing of specifications. The section title is not intended to limit meaning or content of section, not to be fully descriptive or requirements specified therein, not to be an integral part of text.
 - a. Each section of specifications has been subdivided into 3 (or less) "parts" for uniformity and convenience (Part 1 - General, Part 2 - Products, and Part 3 - Execution). These do not limit the meaning or and are not an integral part of text which specifies requirements.
2. **Underscoring:** used strictly to assist reader of specification text in scanning text for key works in content (for quick recall). No emphasis on or relative importance of text is intended where underscoring is used.
3. **Imperative Language:** Used generally in specifications. Except as otherwise indicated requirements expressed imperatively are to be performed by the Contractor. For clarity of reading at certain locations, contrasting subjective language is used to describe responsibilities which must be fulfilled indirectly by the Contractor, or when so noted, by others.
4. **Section Numbering:** Used to facilitate cross-references in Contract Documents. Sections are placed in Project Manual in numeric sequence; however, numbering sequence is not complete, and listing of sections at beginning of Project Manual must be consulted to determine numbers and names of specification section on Contract Documents.
5. **Page Numbering:** Numbered independently for each section' recorded in listing of sections (Index or Table of Contents) in Project Manual. Section number is shown with page number at top right of each page, to facilitate location of text in Project Manual.

C. **Specification Content:** Because of methods by which this project specification has been produced, certain general characteristics of content, and conventions in use of language are explained as follows:

1. **Specifying Methods:** The techniques or methods of specifying to record requirements varies throughout text, and may include "prescriptive", "open generic descriptive", "compliance with standards", "performance",

- "proprietary", or a combination of these. The method used for specifying one unit of work has no bearing on requirements for another unit of work.
2. **Overlapping and Conflicting Requirements:** Where compliance with 2 or more industry standards or sets of requirements is specified, and overlapping of those different standards or requirements establishes different or conflicting minimums or levels or quality, most stringent requirement (which is generally recognized to be also most costly) is intended and will be enforced, unless specifically detailed language written into contract documents (not by way of reference to an industry standard) clearly indicates that a less stringent requirement is to be fulfilled. Refer apparently-equal-but-different requirements, and uncertainties as to which level of quality is more stringent, to Architect/Engineer for a decision before proceeding.
 - a. **Contractor's Options:** Except for overlapping or conflicting requirements, where more than one set of requirements are specified for a particular unit of work, option is intended to be Contractor's regardless of whether specifically indicated as such.
 3. **Minimum Quality/Quantity:** In every instance, quality level or quantity shown or specified is intended as minimum for the work to be performed or provided. Except as otherwise specifically indicated, actual work may either comply exactly with that minimum (within specified tolerances), or may exceed that minimum within reasonable limits. In complying with requirements, indicated numeric values are either minimums or maximums as noted or as appropriate for context of requirements. Refer instances of uncertainty to Architect/Engineer for decision before proceeding.
 4. **Specialists; Assignments:** In certain instances, specification text requires (or at least implies) that specific work be assigned to specialists or expert entities, who must be engaged for performance of those units of work. These must be recognized as special requirements over which Contractor has no choice or option. These assignments must not be confused with (and are not intended to interfere with) normal application of regulations union jurisdictions and similar conventions. One purpose of such assignments is to establish which party or entity involved in a specified unit of work is recognized as "expert" for indicated construction processes or operations. Nevertheless, final responsibility for fulfillment of entire set of requirements remains with Contractor.
 5. **Trades:** Except as otherwise indicated, the use of title such as "carpentry" in specification text, implies neither that the work must be performed by an accredited or unionized trades person of corresponding generic name (such as "carpenter"), nor that specified requirements apply exclusively to work by trades persons of that corresponding generic name.
 6. **Abbreviations:** The language of specifications and other contract documents is of the abbreviated type in certain instances, and implies words and meanings which will be appropriately interpreted. Actual work abbreviations of self-explanatory nature have been included in texts.

Specific abbreviations have been established, principally for lengthy technical terminology and primarily in conjunction with coordination of specification requirement with notations on drawings and in schedules. These are frequently defined in section at first instance of use. Trade association names and titles of general standards are frequently abbreviated.

7. Singular works will be interpreted as plural and plural words will be interpreted as singular where applicable and where full context of the Contract Documents so indicates.

D. Drawing Symbols:

1. General: Except as otherwise indicated, graphic symbols used on drawings are those symbols recognized in the construction industry for purposes indicated. Where not otherwise noted, symbols are defined by "Architectural Graphic Standards", published by John Wiley & Sons, Inc., seventh edition.
 - a. M/E Drawings: Graphic symbols used on mechanical/electrical drawings are generally aligned with symbols recommended by ASHRAE, supplemented by more specific symbols where appropriate as recommended by other recognized technical associations including ASME, ASPE, IEEE and similar organizations. Refer instances of uncertainty to Architect/Engineer for clarification before proceeding.

E. Industry Standards:

1. General Applicability of Standards: Applicable standards of construction industry have same force and effect (and are made a part of contract Documents) as if published copies were bound herewith.
 - a. Referenced Standards: (referenced directly in Contract Documents or by governing regulations) have precedence over non-referenced standards which are recognized in industry for applicability to work.
 - b. Non-referenced standards are hereby defined to have not particular applicability to the work, except as a general measurement of whether work complies with standards recognized in construction industry.
2. Publication Dates: Except as otherwise indicated, where compliance with an industry standard is required, comply with the latest edition of the standard in effect as of date of Contract Documents.
3. Copies of Standards: Provide as needed for proper performance of the work; obtain directly from publication sources. Architect/Engineer may specifically required the Contractor to obtain copies of certain standards.
4. Abbreviations and names: The following acronyms or abbreviations as referenced in Contract Documents are defined to mean the associated

names. Both names and addresses are subject to change, and are believed to be, but are not assured to be, accurate and up-to-date as of date of Contract Documents.

AA	Aluminum Association 818 Connecticut Avenue NW; Washington, D.C. 20006; 202/862-5100
AAMA	Architectural Aluminum Manufacturers Association 35 E. Wacker Dr.; Chicago, IL 60601; 312/782-8256
AAN	American Association of Nurserymen 230 Southern Bldg.; Washington, D.C. 20005; 202/737-4060
AASHTO	American Association of State Highway & Transportation Officials 444 N. Capital; Washington, D.C. 20001; 202/624-5800
AATCC	American Association of Textile Chemists and Colorists P.O. Box 12215; Research Triangle Park, N.C. 27709; 919/549-8141
ACI	American Concrete Institute P.O. Box 19150; Detroit, MI 48219; 313/532-2600
ACIL	American Council of Independent Laboratories 1725 K Street, NW; Washington, D.C.; 20006; 202/659-3766
ADC	Air Diffusion Council 230 N. Michigan Avenue; Chicago, IL 60601; 312/372-9800
AGA	American Gas Association 1515 Wilson Blvd.; Arlington, VA 22209; 703/841-8400
AI	Asphalt Institute Asphalt Institute Building; College Park, MD 20740; 301/277-4258
AIA	American Institute of Architects 1735 New York Avenue, NW; Washington, D.C. 20006; 202/626-7474
A.I.A.	American Insurance Company 85 John Street; New York, NY 10038; 212/699-0400
AISC	American Institute of Steel Construction 400 North Michigan Avenue; Chicago, IL 60611; 312/670-2400

AISI	American Iron and Steel Institute 1000 16th Street, NW; Washington, D.C. 20036; 202/452-7100
AITC	American Institute of Timber Construction 333 W. Hampden Avenue Englewood, Colorado 80110; 303/761-3212
AMCA	Air Movement and Control Association 30 W. University Dr. Arlington Heights, IL 60004; 312/394-0150
ANSI	American National Standards Institute 1430 Broadway New York, New York 10018; 212/354-3300
APA	American Plywood Association Post Office Box 11700 Tacoma, Washington 98411; 206/565-6600
ARI	Air Conditioning & Refrigeration Institute 1815 North Fort Myer Dr. Arlington, Virginia 22209; 703/524-8800
ASC	Adhesive and Sealant Council 1600 Wilson Boulevard Arlington, Virginia 22209; 703/841-1112
ASHRAE	American Society of Heating, Refrigeration & Air-Conditioning Engineers 1791 Tullie Circle, NE Atlanta, Georgia 30329; 404/636-8400
ASME	American Society of Plumbing Engineers 345 E. 47th Street New York, New York 10017; 212/644-7722
ASPE	American Society of Plumbing Engineers 15233 Ventura Boulevard Sherman Oaks, California 91403; 213/783-4845
ASSE	American Society of Sanitary Engineering Post Office Box 9712 Bay Village, Ohio 44140; 216/835-3040
ASTM	American Society for Testing and Material 1916 Race Street Philadelphia, PA 19103; 215/299-5400

AWI	Architectural Woodwork Institute 2310 South Walter Reed Dr. Arlington, Virginia 22206; 703/671-9100
AWPA	American Wood-Preservers' Association 7735 Old Georgetown Road Bethesda, Maryland 20014; 301/652-2109
AWPB	American Wood-Preservers Bureau 2772 South Randolph Street Arlington, Virginia 22206; 703/931-8180
AWS	American Welding Society 550 LeJune Road Miami, Florida 33135; 305/642-7090
AWWA	American Water Works Association 6666 W. Quincy Avenue Denver, Colorado 80235; 303/794-7711
BHMA	Builder's Hardware Manufacturer's Association (c/o TGAM) 60 East 42nd St. Rm. 1807 New York, New York 10017; 212/682-8142
BIA	Brick Institute of America 1750 Old Meadow Rd. McLean, Virginia 22101; 703/893-4010
CDA	Copper Development Association 405 Lexington Avenue New York, New York 10017; 212/953-7300
CE	Corps of Engineers (U.S. Dept. of the Army) Washington, D.C. 20315
CISPI	Cast Iron Soil Pipe Institute 1499 ChainBridge Rd. McLean, Virginia 22101; 703/827-9177
CRSI	Concrete Reinforcing Steel Institute 180 North LaSalle Street Chicago, Illinois 60601; 312/372-5059
CS	Commercial Standard of NBS (U.S. Dept. of Commerce) Government Printing Office

Washington, D.C. 20402

DHI	Door and Hardware Institute 1815 N. Ft. Meyer Dr. Arlington, Virginia 22209; 703/527-2060
EIA	Electronic Industries Association 2001 Eye Street, NW Washington, D.C. 20006; 202/457-4900
FAA	Federal Aviation Administration (U.S. Dept. of Transportation) 800 Independence Avenue, SW Washington, D.C. 20590
FCC	Federal Communications Commission 1919 M Street, NW Washington, D.C. 20554; 202/632-7000
FCI	Fluid Controls Institute Post Office Box 3854 Tequesta, Florida 33458; 407/746-6466
FGMA	Flat Glass Marketing Association 3310 Harrison Topeka, Kansas 66611; 913/266-7013
FHA	Federal Housing Administration (U.S. Dept. of HUD) 451 7th Street, SW Washington, D.C. 20201
FM	Factory Mutual Engineering Corp. 1151 Boston-Providene Turnpike Norwood, MA 02062; 617/762-4300
FS	Federal Specification (General Services Administration) Building 197, Washington Navy Yard, SE Washington, D.C. 20407
FTI	Facing Tile Institute Box 8880 Canton, Ohio 44711; 216/488-1211
GA	Gypsum Association 1603 Orrington Avenue Evanston, Illinois 60201; 312/491-1744

HPMA	Hardwood Plywood Manufacturers Association Post Office Box 2789 Reston, Virginia 22090; 703/435-2900
IES	Illuminating Engineering Society of North America 345 E. 47th Street New York, New York 10017; 212/644-7926
ILI	Indiana Limestone Institute of America Stone City Bank Building Bedford, Indiana 47421; 812/275-4426
IRI	Industrial Risk Insurers 85 Woodland Street Hartford, CT 06102; 203/525-2601
MCAA	Mechanical Contractors Association of America 5530 Wisconsin Avenue Washington, D.C. 20015; 202/654-7960
MIA	Marble Institute of America 33505 State Street Farmington, MI 48024; 313/476-5558
MIL	Military Standardization Documents (U.S. Dept. of Defense) Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120
MLSFA	Metal Lath/Steel Framing Association 221 N. LaSalle Street Chicago, IL 60601; 312/346-1600
MSS	Manufacturers Standardization Society of the Valve and Fittings Industry 5203 Leesburg Pike Falls Church, Virginia 22041; 702/998-7996
NAAMM	The National Association of Architectural Metal Manufacturers 221 N. LaSalle Street Chicago, Illinois 60601; 312/346-1600
NAPF	National Association of Plastic Fabricators 1701 N. Street, NW Washington, D.C. 20036; 202/656-8874
NBGOA	National Building Granite Quarries Association 202 South Third Avenue

Cold Spring, MN 55107

NBS	National Bureau of Standards (U.S. Dept. of Commerce) Gaithersburg, Maryland 20234
NCMA	National Concrete Masonry Association Post Office Box 781 Herndon, Virginia 22070; 703/435-4900
NEC	National Electric Code (by NFPA)
NECA	National Electric Contractors Association 7315 Wisconsin Avenue Washington, D.C. 20014; 202/657-3110
NEII	National Elevator Industry, Inc. 600 Third Avenue New York, New York 10016; 212/986-1545
NEMA	National Electrical Manufacturers Association 2101 L Street, NW Washington, D.C. 20037; 202/457-8400
NFPA	National Fire Protection Association 470 Atlantic Avenue Boston, MA 02210; 617/482-8755
N.F.P.A.	National Forest Products Association 1619 Massachusetts Avenue, NW Washington, D.C. 20036; 202/797-5800
NHLA	National Hardwood Lumber Association Post Office Box 34518 Memphis, Tennessee 38104; 901/377-1818
NPA	National Particleboard Association 2306 Perkins Place Silver Spring, Maryland 20910; 301/587-2204
NRCA	National Roofing Contractors Association One O'Hare Center 6250 River Road Rosemont, Illinois 60018; 312/318-6722
NSF	National Sanitation Foundation 3475 Plymouth Rd. Ann Arbor, Michigan 48106; 313/769-8010

NSSEA	National School Supply & Equipment Association 1500 Wilson Boulevard Arlington, Virginia 22209; 703/524-8819
NTMA	The National Terrazzo and Mosaic Association 3166 Des Plains Avenue Des Plains, Illinois 60018; 312/635-7744
NWMA	National Wood Manufacturer's Association 205 W. Touhy Avenue Park Ridge, Illinois 60068; 312/823-6747
OSHA	Occupational Safety Health Administration (U.S. Dept. of Labor) Government Printing Office Washington, D.C. 20402
PCI	Prestressed Concrete Institute 20 N. Wacker Dr. Chicago, Illinois 60606; 312/346-4071
PDI	Plumbing and Draining Institute 5342 Boulevard Place Indianapolis, Indiana 46208; 317/251-5298
PEI	Porcelain Enamel Institute 1911 N. Fort Myer Arlington, Virginia 22209; 703/527-5257
PS	Product Standard of NBS (U.S. Dept. of Commerce) Government Printing Office Washington, D.C. 20402
RFCI	Resilient Floor Covering Institute 1030 15th Street, NW Washington, D.C. 20005; 202/833-2635
RIS	Redwood Inspection Service (Grading Rules) 627 Montgomery San Francisco, California 94111
SAMAS	Scientific Apparatus Makers Association 1101 16th Street, NW Washington, D.C. 20036; 202/223-1360
SDI	Steel Deck Institute Post Office Box 3812

St. Louis, MO 63122; 314/965-1741

S.D.I.	Steel Door Institute 712 Lakewood Center, N. Cleveland, Ohio 44107; 216/226-7700
SHLMA	Southern Hardwood Lumber Manufacturers Association 805 Sterick Boulevard Memphis, Tennessee 38103; 901/525-8221
SIGMA	Sealed insulating Glass Manufacturers Association 111 E. Wacker Dr. Chicago, Illinois 60601; 312/644-6610
SJI	Steel Joist Institute 1703 Parham Rd. Richmond, Virginia 23229; 804/288-3071
SMACNA	Sheet Metal & Air Conditioning Contractors' National Association Post Office Box 70 Merrifield, Virginia 22116
SPIB	Southern Pine Inspection Bureau (Grading Rules) 4709 Scenic Highway Pensacola, Florida 32504; 904/434-2611
SSPC	Steel Structures Painting Council 4400 5th Avenue Pgh, PA 15213; 412/578-3327
TCA	Tile Council of America Post Office Box 326 Princeton, New Jersey 08540; 609/921-7050
TIMA	Thermal Insulation Manufacturers Association 7 Kirby Plaza Mt. Kisco, New York 10549; 914/241-2284
TPI	Truss Plate Institute 100 W. Church St. Frederick, Maryland 21701; 301/694-6100
UL	Underwriters Laboratories 333 Pfingsten Rd. Northbrook, Illinois 60062; 312/272-8800

WCLIB	West Coast Lumber Inspection Bureau (Grading Rules) Post Office Box 2315 Portland, Oregon 97223; 503/649-0651
WIC	Woodwork Institute of California 1833 Broadway Fresno, California 93773; 209/233-9035
WRI	Wire Reinforcement Institute 8900 Westpark Drive McLean, Virginia 22101; 703/790-9790
WSFI	Wood and Synthetic Flooring Institute 2400 E. Devon Des Plaines, Illinois 60018; 312/635-7700
WWPA	Western Wood Products Association (Grading Rules) 1500 Yeon Building Portland, Oregon 97204; 503/224-3930
W.W.P.A.	Woven Wire Products Association 108 W. Lake Street Chicago, Illinois 60601; 312/332-6502

F. Governing Regulations/Authorities:

1. General: The procedure followed by Architect/Engineer has been to contact governing authorities where necessary to obtain information needed for the purpose of preparing Contract Documents; recognizing that such information may or may not be of significance in relation to Contractor's responsibilities for performing the work. Contract governing authorities directly for necessary information and decisions having a bearing on performance of the work.

G. Submittals:

1. Permits, Licenses and Certificates: For the Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgements, and similar documents, correspondence and records established in conjunction with compliance with records established in conjunction with compliance with standards and regulations bearing upon performance of the work.

PART 2 - PRODUCTS

Not applicable.

PART 3 - EXECUTION

Not applicable.

END OF SECTION 010900

SECTION 012000 - PROJECT MEETINGS

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED:

- A. Contractor shall attend a Pre-Construction meeting administered by the Owner.
- B. Contractor shall schedule and administer monthly progress meetings and specially called meetings throughout progress of work.
 - 1. Prepare agenda for meetings.
 - 2. Distribute written agenda of each meeting four days in advance of meeting date.
 - 3. Make physical arrangements for meetings.
 - 4. Preside at meetings.
 - 5. Record the minutes; include significant proceedings and decisions.
 - 6. Reproduce and distribute copies of minutes within three days after each meeting.
 - a. To participants in the meeting.
 - b. To parties affected by decisions made at the meetings.
 - c. Furnish three copies of minutes to Architect/Engineer.
- C. Representative of Contractors, Subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
- D. Owner and Architect/Engineer shall be invited to all such meetings and may attend to ascertain that Work is expedited consistent with Contract Documents and construction schedules.

1.2 RELATED REQUIREMENTS:

- A. Bidding Conditions.
- B. Contractual Conditions.
- C. Shop drawings, product data and samples.
- D. Section 010400 - Coordination.

1.3 PRECONSTRUCTION MEETING:

- A. Location: A site designated by owner.
- B. Attendance:
 - 1. Owner's Project Manager.
 - 2. As – Required by the Owner - Architect/Engineer and/or his professional consultants.
 - 3. Contractor's Superintendent.
 - 4. Major Subcontractors.
 - 5. Others as Appropriate.
- C. Suggested Agendum:
 - 1. Distribution and discussion of:
 - a. List of major subcontractors and suppliers.
 - b. Projected Construction Schedules.
 - 2. Critical work sequencing.
 - 3. Major equipment deliveries and priorities.
 - 4. Project Coordination:
 - a. Designation of responsible personnel.
 - 5. Procedures and processing of:
 - a. Field decisions.
 - b. Proposal requests.
 - c. Submittals.
 - d. Change Orders.
 - e. Applications for Payment.
 - 6. Adequacy of distribution of Contract Documents.
 - 7. Procedures for maintaining Record Documents.
 - 8. Use of Premises:
 - a. Office, work and storage areas.
 - b. Owner's requirements.
 - 9. Construction facilities, controls and construction aids.
 - 10. Temporary Utilities.
 - 11. Safety and first-aid procedures.
 - 12. Security procedures.
 - 13. Housekeeping procedures.

1.4 PROGRESS MEETINGS:

- A. Contractor shall schedule regular periodic meetings at least monthly or more often if deemed appropriate by the Architect.
- B. Hold called meetings as required by progress of work.
- C. Location of the meetings: Project field office of Contractor.
- D. Attendance:
 - 1. Owner and (as required by the Owner) Architect/Engineers and his professional consultants as needed.
 - 2. Subcontractors as appropriate to the agenda.
 - 3. Suppliers as appropriate to the agenda.
 - 4. Others.
- E. Suggested Agendum:
 - 1. Review, approval of minutes of previous meetings.
 - 2. Review of work progress since previous meetings.
 - 3. Field observations, problems, conflicts.
 - 4. Problems which impeded Construction Schedule.
 - 5. Review of off-site fabrication, delivery schedule.
 - 6. Corrective measures and procedures to regain projected schedule.
 - 7. Revisions to Construction Schedule.
 - 8. Progress, schedule, during succeeding work period.
 - 9. Coordination of schedules.
 - 10. Review submittal schedules; expedite as required.
 - 11. Maintenance of quality standards.
 - 12. Pending changes and substitutions.
 - 13. Review proposed changes for:
 - a. Effect on Construction Schedule and on completion date.
 - b. Effect on other contracts of the Project.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 012000

SECTION 012100 - PROCEDURES AND PERFORMANCES

PART 1 - PROCEDURES

- A. Observation: The Architect and his Consulting Engineers may review all the work including Architectural, Civil, Structural, Plumbing, Electrical and Mechanical on this project.

PART 2 - PERFORMANCE

- A. Measurements and Dimensions: Before ordering materials or doing work which is dependent for proper size, or installation upon coordination with building conditions, the Contractor shall verify all dimensions by taking measurements at the building and shall be responsible for the correctness of same. No consideration will be given any claim based on the difference between the actual dimensions and those indicated on the drawings. Any discrepancies between the drawings and/or the specifications and the existing conditions shall be referred to the Architect for adjustment before any work affected thereby is begun.

PART 3 - EXECUTION

Not used.

END OF SECTION 012100.

SECTION 013100 - CONSTRUCTION SCHEDULE

PART 1 - GENERAL

1.1 The progress schedule required under the General Conditions shall be prepared using the critical path method as described in the Supplementary General Conditions and herein.

- A. The critical path schedules requirement will consist of a two-part network submittal (interim schedule, and detailed schedule), along with monthly progress status reports (Monthly Report), quarterly progress forecast reports (Quarterly Report), and monthly update to the networks and analysis. The planning, scheduling, management, and execution of the Work is the sole responsibility of the Contractor. The progress schedule requirement is established to allow Owner to review Contractor's planning, scheduling, management and execution of the work; to assist owner in evaluating work progress and make progress payments; and to allow other contractors to cooperate and coordinate their activities with those of the Contractor.
- B. Review of the schedule of submittals shall not relieve Contractor from responsibility for any deviations from the Contract Documents unless Contractor has, in writing, submission and received written concurrence to the specific deviations, nor shall any concurrence by Owner and Architect/Engineer relieve Contractor from, responsibility for errors and omissions in the submittals.

1.2 INTERIM SCHEDULE SUBMITTALS

- A. Submittal set shall include a time-scaled graphic arrow diagram, a detailed schedule of values incorporating shop drawing submittals, and interim status reports. The initial submittal shall be delivered within fourteen (14) calendar days of the effective date of the Agreement and shall use the Notice to Proceed as the data date. The submittal shall be submitted on time, be completed, comply with all contract conditions, and represent realistic approach to the Work. No progress payments for work performed shall be made until this submittal set is submitted and accepted.
- B. The graphic arrow diagram shall show one (1) detailed activity for all work to be performed during the first 120 calendar days after Notice to Proceed, and two (2) summary activities for the remainder of the contract.
- C. Interim status reports shall be revised and submitted monthly following the initial preliminary schedule submittal, and continue through the first 120 calendar days.

1.3 DETAILED SCHEDULE SUBMITTAL

- A. Submittals shall include a time-scaled (day after Notice to Proceed) graphic arrow diagram showing all contract activities, computer printout reports, and a supporting narrative. The initial detailed schedule submittal shall be delivered within 60

calendar days after the Notice to Proceed, and shall use the Notice to Proceed as the data date. The submittal shall be on time, complete, comply with all Contract conditions, and represent a reasonable approach to the Work. No progress payments shall be made for work performed after the first 120 days of the Contract until the detailed schedule submittal is submitted and accepted.

- B. The graphic arrow diagram shall be formatted in accordance with the paragraph 2A above. The diagram shall include all detailed activities included in the interim schedule submittal grouped by major areas of work and detailed activities, as shown on the Schedule of Values.

1.4 QUARTERLY PROGRESS REPORTS

- A. Not later than 120 calendar days after the Notice to Proceed, and at three month intervals thereafter, Contractor shall submit to the Architect/Engineer, a draft Quarterly Progress Report with data as of the last day of the current pay period. Submittals of a Quarterly Progress Report shall be in lieu of the corresponding Monthly Report. Within thirty calendar days after receipt of this report, Owner, Architect/Engineer, and Contractor shall meet to discuss the draft report and reach an agreement on job progress. Job progress shall specifically include:
 - 1. Actual completion dates for activities completed during the quarterly report period, and actual start dates for activities commenced during the quarterly report period.
 - 2. Estimated start dates for activities scheduled to commence during the following quarterly report period.
 - 3. Changes in the duration of any activity and minor logic changes.
 - 4. Activities not included in the currently accepted, detailed graphic arrow diagram.
 - 5. Major changes in scope and other identifiable changes.

1.5 SUBMISSIONS

- A. Submit initial schedules within 14 days after award of Contract.
 - 1. Architect will review schedules and return review copy within 10 days after receipt.
 - 2. If required, resubmit within 7 days after return of review copy.
- B. Submit revised and/or updated progress schedules with each application for payment.

1.6 DISTRIBUTION

- A. Distribute copies of the reviewed schedules to:

1. Architect/Engineer
2. Owner's Representative
3. Subcontractors
4. Other concerned parties

B. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedules.

1.7 COMPLIANCE

A. See the Supplementary General Conditions for consequences of non-compliance.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 013100.

SECTION 013400 - SUBMITTALS

PART 1 - GENERAL

1.1 REQUIREMENTS INCLUDED:

- A. Submit Shop Drawings, Product Data and Samples required by Contract Documents.

1.2 RELATED REQUIREMENTS:

- A. Definitions and Additional Responsibilities of Parties: General Conditions of the Contract.
- B. Designate in the Construction Schedule, Application for Payments, or in a separate coordinated schedule, the dates for submission of Shop Drawings, Product Data and Samples.
- C. Contractual Conditions

1.3 SHOP DRAWINGS:

- A. Drawings shall be presented in a clear and thorough manner.
 - 1. Details shall be identified by reference to sheet and detail, schedule or room numbers shown on Contract Drawings.
- B. Drawings shall be original drawings, prepared by Contractor, Subcontractor, Supplier or Distributor, which illustrate some portion of the work, showing fabrication, layout, setting or erection details. **DUPLICATION OF CONTRACT DOCUMENTS FOR ANY SUBMITTAL SHALL NOT BE ACCEPTABLE.**
 - 1. Prepared by a qualified detailer.
 - 2. Identify details by reference to sheet and detail numbers shown on Contract Drawings.
 - 3. The contractor may, at his expense, purchase a limited set of electronic files of the Contract Documents from the Architect/Engineer to assist in the production of the Shop Drawings. The file set shall be limited to the specific area of interest to the Contractor. All fee schedules for the files shall be set by the Architect/Engineer. The Architect/Engineer reserves all rights to the files under copyright laws and reserves the right to not

release any electronic files.

- C. Shop Drawing transmittal letter shall be submitted separate for each required section as provided at the end of this section. Submittal shall note any and all deviations from Contract Documents.

1.4 PRODUCT DATA:

A. Preparation

1. Clearly mark each copy to identify pertinent products or models.
2. Show performance characteristics and capacities.
3. Show dimensions and clearances required.
4. Show wiring or piping diagrams and controls.
5. Note deviations from Contract Documents.

B. Manufacturer's standard schematic drawings and diagrams:

1. Modify drawings and diagrams to delete information which is not applicable to the work.
2. Supplement standard information to provide information specifically applicable to the work.
3. Note deviations from Contract Documents.

1.5 SAMPLES:

- A. Office samples shall be of sufficient size and quantity to clearly illustrate materials, equipment or workmanship, and to establish standards by which completed work is to be judged.

1. Functional characteristics of the product, with integrally related parts and attachment devices.
2. Full range of color, texture and pattern.
3. After review, samples shall be used for comparison in construction of project.
4. Note deviations from Contract Documents.

B. Field samples and mock-ups.

1. Erect at project site at location acceptable to Architect/Engineer.
2. Construct each sample or mock-up complete, including work of all trades required in finished work.
3. Note deviations from Contract Documents.

1.6 CONTRACTOR RESPONSIBILITIES:

- A. Review Shop Drawings, Product Data and Samples prior to submission.
 - 1. Check and stamp submittal with his approval.
- B. Determine and verify:
 - 1. Field measurements.
 - 2. Field construction criteria.
 - 3. Catalog numbers and similar data.
 - 4. Conformance with specifications.
 - 5. Note deviations from Contract Documents.
- C. Coordinate each submittal with requirements of the work and of the Contract Documents.
- D. Notify the Architect/Engineer in writing, at time of submission, of his review and approval of submittal and of any deviations in the submittals from requirements of the Contract Documents.
 - 1. Contractor's responsibility for deviations in submittals from requirements of Contract Documents is not relieved by Architects/Engineers review of submittals, unless specific deviations are called to the attention of the Architect/Engineer in writing and the Architect/Engineer gives written acceptance of specific deviations.
 - 2. Contractor's responsibility for errors and omissions in submittals is not relieved by Architect's/Engineer's review of submittals.
- E. Begin no fabrication or work which requires submittals until return of submittals with Architect/Engineer review.
- F. Submittals not reviewed and approved by the Contractor will be rejected.

1.7 SUBMISSION REQUIREMENTS:

- A. Make submittals promptly in accordance with accepted schedule, and in such sequence as to cause no delay in the work or in the work of any other Contractor. Use transmittal format included herein.
- B. Number of submittals required:

1. Shop Drawings: Submit sufficient quantity of prints of shop drawing for the Contractor's use and two (2) copies to be retained by the Architect.
2. Product Data: Submit sufficient quantity of Product Data for the Contractor's use and two (2) copies to be retained by the Architect.
3. Samples: Submit the number stated in each specification section. Provide two (2) samples if not indicated.

C. Submittals shall contain:

1. The date of submission and the dates of any previous submissions.
2. The project title and number.
3. Contract identification.
4. The names of Contractor, Supplier and Manufacturer.
5. Identification of the product, with the specification section number.
6. Field dimensions, clearly identified as such.
7. Relation to adjacent or critical features of the work or materials.
8. Identification of revisions on re-submittals.
9. Applicable Standards (such as ASTM or Federal Specification numbers).
10. An 8 inch x 3 inch blank space for contractor and Architect/Engineer or provide review status cover page.
11. Contractor's stamp, initialed or signed, certifying to review of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the work and of Contract Documents.

1.8 RE-SUBMISSION REQUIREMENTS:

- A. Make any corrections or changes in the submittals required by the Architect/Engineer and resubmit until accepted.
- B. Shop drawings and product data:
 1. Revise initial drawings of data, and resubmit as specified for the initial submittal.
 2. Cloud any change which has been made.
 3. Indicate shop drawing is being resubmitted, use Architect's/Engineer's shop drawing identification number if provided.
- C. Samples: Submit new samples if requested by Architect.

1.9 DISTRIBUTION

- A. Distribute reproductions of Shop Drawings and copies of Product Data which carry the Architect/Engineer stamp of acceptance to:
 - 1. Job site file.
 - 2. Subcontractors.
 - 3. Supplier or Fabricator.
 - 4. Project close-out documents (Section 01700).

1.10 ARCHITECT/ENGINEER DUTIES

- A. Review submittals; allowing Architect/Engineer a period of 14 calendar days for review and return of Shop drawings.
- B. Affix stamp and initials or signature and indicate requirements for resubmittal or approval of submittal.
- C. Return submittals to Contractor for distribution of for re-submission.
- D. Forward copy of submittal for Owner's use and information. This shall not relieve contractor's requirements in other sections to provide the Owner with a complete record copy at job close-out.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 SHOP DRAWING SUBMITTALS SHALL BE REVIEWED IN ACCORD WITH THE FOLLOWING:

- A. Review by Architect/Engineer of Record of submittals is for general conformance with the design concept as presented by the Contract Documents. No detailed check of quantities or dimensions will be made.
- B. The General Contractor/Construction Manager is responsible for assuring that all submittals comply with the latest project plans, specifications, governing codes and regulations and is solely responsible for confirming all quantities, dimensions, fabrication techniques and coordinating work with all trades.
- C. Shop drawings are to be submitted in a timely manner allowing adequate time for

processing. An average submittal is reviewed by the Architect/Engineer of Record within 14 calendar days of receipt.

- D. Submit shop drawings for specific components, such as columns, footings, etc., in their entirety. Shop drawings for similar floors shall be submitted in the same package.
- E. All submittals are to be accompanied by a letter of transmittal. Do not combine different submittals on the same transmittal.
- F. All shop drawings must bear evidence of the Contractor's approval prior to submitting to the Architect/Engineer of Record.
- G. Submit quantities per Part 1; 7.B.
- H. All changes and additions made on re-submittals must be clearly flagged and noted. The purpose of the re-submittals must be clearly noted on the letter of transmittal. Architect/Engineer of Record review is limited to those items causing the resubmission.
- I. For criteria applicable to shop drawings requiring engineering input by a specialty engineer, see below.
- J. Shop drawings not meeting the above criteria or submitted after fabrication will not be reviewed.
- K. The Contract Documents are not to be reproduced for use as shop drawings.

3.2 SHOP DRAWINGS REQUIRING INPUT BY SPECIALTY ENGINEER SHALL BE REVIEWED IN ACCORD WITH THE FOLLOWING:

- A. Specialty Engineer:
 - 1. Definition - A Florida registered professional engineer, not the structural engineer of record, who specializes in and who undertakes the design of structural components or structural systems included in a specific submittal prepared for this project.
 - 2. Shall be:
 - a. An employee or officer of a fabricator.
 - b. An employee or officer of an entity supplying components to a fabricator.
 - c. An independent consultant retained by the fabricator of his supplier.

- B. Shop Drawings requiring a specialty engineer are fabrication and erection drawings prepared for, but not limited to the following items:
1. Aluminum or light gage steel exterior wall systems, prefabricated steel stairs, handrails, precast concrete components, post-tensioning systems, prefabricated wood components, open web steel joists, formwork and falsework shoring and reshoring.
- C. Submittals shall clearly identify the specific project, applicable codes, list the design criteria, and shall show all details and plans necessary for proper fabrication and installation. Calculations and shop drawings shall identify specific product utilized. Generic products will not be accepted.
- D. Shop drawings and calculations must be prepared under the direct supervision and control of the specialty engineer.
- E. Shop drawings and calculations require the impressed seal, date and signature of the specialty engineer. Computer printouts are an acceptable substitute for manual computations provided they are accompanied by sufficient descriptive information to permit their proper evaluation. Such descriptive information shall bear the impressed seal and signature of the specialty engineer as an indication that he has accepted responsibility for the results. Architect/Engineer of Record will retain one signed and sealed print for record.
- F. Drawings prepared solely to serve as a guide for fabrication and installation (such as reinforcing steel shop drawings or structural steel erection drawings) and requiring no engineering input do not require the seal of a specialty engineer.
- G. Catalog information on standard products does not required the seal of a specialty engineer.
- H. Review by the Architect and Structural Engineer of record of submittals is limited to verifying the following:
1. That the specified structural submittals have been furnished.
 2. That the structural submittals have been signed and sealed by the specialty engineer.
 3. That the specialty engineer has understood the design intent and has used the specified structural criteria. (No detailed check of calculations will be made.)
 4. That the configuration set forth in the structural submittals is consistent with the contract documents. (No detailed check of dimensions or quantities will be made.)
- I. List of drawings shall be prepared and maintained for all shop drawings requiring

participation of a specialty engineer. The list shall contain project name, name of General Contractor/Construction Manager, name of subcontractor, name of specialty engineer, drawings number, drawing title and latest revision number and date. For partial submittals, the list shall contain all anticipated drawing numbers and titles required to complete the contract. The General Contractor/Construction Manager is responsible for submitting the latest updated list of drawings with each submittal.

- J. Upon the completion of the submittal process for the project, the Contractor shall submit to the Architect/Engineer of Record a notarized affidavit stating the following:
 - 1. "This is to certify that the undersigned as General Contractor/Construction Manager for the referenced project has furnished to and has received acceptance from the Architect/Engineer of Record for all structural submittals requiring participation of a specialty engineer. These submittals were prepared for work performed by the following subcontractors: (name of subcontractors)..." The final lists of shop drawings shall be attached to the affidavit.
- K. Submittals not meeting the above criteria will not be reviewed.
- L. Submit quantities per Part 1; 7.B.

END OF SECTION 013400

SECTION 013700 - SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 GENERAL REQUIREMENTS:

- A. Related requirements specified elsewhere.
 - 1. Progress Meetings: Section 012000.
 - 2. Construction Schedule: Section 013100.
- B. Submit to the Architect/Engineer a Schedule of Values, no later than 14 calendar days after date of Notice to Proceed.
- C. Upon request by Architect/Engineer, support values given with data that will substantiate their correctness.
- D. Use Schedule of Values only as basis for Contractor's Application for Payment.

1.2 FORM OF SUBMITTAL:

- A. Submit Typewritten Schedule of Values on AIA form G702, and G703. Computer generated formats of this form are acceptable.
- B. Use table of Contents of this specification as a minimum basis for format for listing cost of Work. Additional breakdowns shall be as determined and required by the Architect/Engineer and Owner. Work shall be broken into labor and material costs.
- C. Identify each line item with number and title as listed in Table of Contents of this Specification.

1.3 PREPARING SCHEDULE OF VALUES:

- A. Itemize separate line item cost for each of the following general cost items as applicable.
 - 1. Performance and Payment Bonds.
 - 2. Field Supervision and Layout.
 - 3. General Conditions.
 - 4. Temporary Facilities and Controls.
 - 5. Other items as deemed appropriate.

- 6. Mobilization
- 7. De-Mobilization

- B. Itemize separate line cost for work required by each section of this Specification. Quantities should be sufficiently detailed and subdivided as necessary to describe all of the labor and materials incorporated into the work to accurately measure the Contractor's progress for periodic payments.

- C. Round off figures to nearest dollar.

- D. Make sum of total cost of all items listed in each schedule equal in total Contract Sum.

1.4 REVIEW AND RESUBMITTAL:

- A. After review by owner and Architect/Engineer, revise and resubmit Schedule of Values as required.

- B. Resubmit revised Schedule of Values in the same format.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTIONS

Not used.

END OF SECTION 013700

SECTION 015100 - TEMPORARY UTILITY CONNECTIONS

PART 1 - GENERAL

- 1.1 REQUIREMENTS: Furnish, install and maintain temporary utilities required for construction, remove on completion of work. These may include, but are not limited to, the following:
- A. Temporary lighting and power for all construction activities, including extension of temporary electrical service into building.
 - B. Temporary heat and ventilation.
 - C. Temporary water for construction, including all distribution systems.
 - D. Temporary sanitary facilities for construction personnel.
 - E. Temporary fire protection system as required by local authorities.
 - F. Provide and make available for use by Subcontractors temporary light, power and water required in the performance of their Work as part of the Work of this Section.
- 1.2 RELATED REQUIREMENTS
- 1.3 REQUIREMENTS OF REGULATORY AGENCIES:
- A. Comply with National Electric Code.
 - B. Comply with Federal, State and local codes and regulations and with utility company requirements.

PART 2 - PRODUCTS

- 2.1 MATERIALS: May be new or used, but must be adequate in capacity for the required usage, must not create unsafe conditions and must not violate requirements of applicable codes and standards.
- 2.2 TEMPORARY ELECTRICITY AND LIGHTING:
- A. Arrange with utility company, provide service required for power and lighting, and pay all costs for service and for power used.
 - 1. Provide required disconnects, grounding, and all other devices and appurtenances required by all applicable agencies and codes, and remove

- same upon completion of work.
 - 2. Provide generator, if required, to obtain power required which is greater than temporary services furnished.
 - 3. Provide all required transformers, fused main switches, distribution boards, panels, but-outs, wiring and grounding, sockets, lamps, fuses and motor connections to suit all load and safety requirements.
- B. Install circuit and branch wiring, with are distribution boxes located so that power and lighting is available throughout the construction by the use of construction type power cords.
 - C. Provide adequate artificial lighting for all areas of work when natural light is not adequate for Work and for areas accessible to the public.
 - D. Provide and maintain temporary feeders to permanent mechanical equipment requiring service, including ventilation, until permanent feeds are connected and energized.
 - E. When directed by Architect/Engineer after permanent power has been switched over, remove those portions of temporary light and power installation which are the responsibility of the Contractor.
 - F. Provide temporary site security lighting to maintain 3 fc measured minimum light level.

2.3 TEMPORARY HEAT AND VENTILATION:

- A. Provide temporary heat and ventilation as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation of materials and to protect materials and finishes from damage due to temperature or humidity.
- B. Provide adequate forced ventilation of enclosed areas for curing of installed materials, to disperse humidity and to prevent hazardous accumulations of dust, fumes, vapors or gases.
- C. Portable heaters shall be standard acceptable units complete with controls.
- D. Pay all costs of installation, maintenance, operation and removal, and for fuel consumed.

2.4 TEMPORARY FIRE PROTECTION SYSTEM: Provide temporary fire protection systems for the project in accord with NFPA Standard #241.

PART 3 - EXECUTION

3.1 GENERAL:

- A. Comply with applicable requirements specified in Division 15 Mechanical and in Division 16 Electrical.
- B. Maintain and operate systems to assure continuous service.
- C. Modify and extend systems as work progress requires.

3.2 REMOVAL:

- A. Completely remove temporary materials and equipment when their use is no longer required.
- B. Clean and repair damage caused by temporary installations or use of temporary facilities.
- C. Restore existing facilities used for temporary services to specified, or to original condition.
- D. Restore permanent utilities used for temporary services to specified condition. Prior to Final Inspection, remove temporary lamps and install new lamps.

END OF SECTION 015100

SECTION 016000 - MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.1 REQUIREMENTS:

A. Material and Equipment Incorporated into the Work:

1. Conform to the applicable specifications and standards.
2. Comply with size, make, type and quality specified, or as specifically accepted in writing by the Architect/Engineer.
3. Manufactured and Fabricated Products:
 - a. Design, fabricate and assemble in accord with the best engineering and shop practices.
 - b. Manufacturer like parts of duplicate units to standard sizes and gauges, to be interchangeable.
 - c. Two or more items of the same kind shall be identical, by the same manufacturer.
 - d. Products shall be suitable for service conditions.
 - e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically accepted in writing.
4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

1.2 RELATED DOCUMENTS:

- A. Contractual Conditions
- B. Section 013400 - Submittals

1.3 MANUFACTURER'S INSTRUCTIONS:

- A. When Contract Documents require that installation of Work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two (2) copies each to Owner and Architect/Engineer.
- B. Maintain one set of complete instructions at the job site during installation and until complete.

- C. Handle, install, connect, clean, condition and adjust products in strict accord with such instructions and in conformity with specified requirements.
 - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Architect/Engineer for further instructions.
 - 2. Do not proceed with work without clear instructions.
- C. Perform Work in accord with manufacturer's instructions, unless otherwise specified. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.4 TRANSPORTATION AND HANDLING:

- A. Arrange deliveries of Products in accord with construction schedules, coordinate to avoid conflict with Work and conditions at the site.
 - 1. Deliver Products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 - 2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and submittals, and that Products are properly protected and undamaged.
- B. Provide equipment and personnel to handle Products by methods to prevent soiling or damage to Products or packaging.

1.5 STORAGE AND PROTECTION:

- A. Store products in accord with manufacturer's instructions, with seals and labels intact and legible.
 - 1. Store products subject to damage by the elements in weather-tight enclosures.
 - 2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.
- B. Exterior Storage.
 - 1. Store fabricated products above the ground, on blocking or skids, prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings, provide adequate ventilation to avoid condensation.
 - 2. Store loose granular materials in a well-drained area on solid surfaces to

3. prevent mixing with foreign matter.
All storage means and methods are subject to acceptance by the Owner and Architect/Engineer.
- C. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored Products to assure that Products are maintained under specified conditions, and free from damage or deterioration.
- D. Protection After Installation:
 1. Provide substantial coverings as necessary, to protect installed products from damage from traffic, water and subsequent construction operations. Remove when no longer needed.
 2. All protection means and methods are subject to acceptance by the Owner and Architect/Engineer.

1.6 SUBSTITUTIONS AND PRODUCT OPTIONS:

- A. Products List:
 1. Within 30 days after Contract Date, submit to Architect, a complete list of major products proposed to be used, with the name of the manufacturer and the installing subcontractor.
- B. Product Options:
 1. For Products specified only by reference standard, select any product meeting that standard.
 2. For Products specified by basis for design and naming several acceptable manufacturers, select any one of the acceptable manufacturers named, which complies with the specification.
 3. For Products specified by naming only one Product and manufacturer, there is no option.
- C. Substitutions
 1. Substitutions after bidding are not acceptable except as indicated in C.2 below.
 2. Substitutions of products will be considered after bids are opened only under the following conditions:
 - a. The Contractor shall place orders for specified materials and equipment promptly upon award of contract. No excuse or proposed substitution will be considered for materials and

equipment due to unavailability unless proof is submitted that firm orders were placed ten days after review by the Architect/Engineer of the item listed in the specifications.

- b. The reason for the unavailability is beyond the control of the Contractor; unavailability will be construed as being due to strikes, lockouts, bankruptcy, discontinuance of the manufacture of the product, or acts of God.
- c. Requests for such substitution shall be made all in writing to the Architect after the award of a contract and within 10 days of the date that the Contractor ascertains that he cannot obtain the material or equipment specified.
- d. Requests shall be accompanied by a complete description of the material or equipment which the contractor wishes to use as a substitute. Substitutions must be recommended by the Architect/Engineer to the Owner who will accept in writing.
- e. Contractor's Representative:
 - 1. A request for substitution constitutes a representation that Contractor:
 - 2. Has investigated the proposed product and determined that it is equal to or superior in all respects to that specified.
 - 3. Will provide the same warranties or bonds for the substitution as for the Product specified.
 - 4. Will coordinate the installation of an accepted substitution into the Work, and make such other changes as may be required to make the Work complete in all respects.
 - 5. Waives all claims for additional costs, under his responsibility, which may subsequently become apparent.
- f. Architect/Engineer will review request for substitutions with reasonable promptness and notify Contractor, in writing, of the decision to accept or reject the requested substitution.
- g. Submit a separate request for each Product, supported with complete data, with drawings and samples as appropriate, including:
 - 1. Comparison of the qualities of the proposed substitution with that specified. Provide data of specified product for comparison.
 - 2. Changes required in other elements of the work because of the substitution.
 - 3. Effect on the construction schedule.
 - 4. Cost data comparing the proposed substitution with the Product specified.
 - 5. Any required license fees or royalties.
 - 6. Availability of maintenance service, and source of

- replacement materials.
7. Submit a sample of the basis for design and the requested substitution; samples will not be returned. Should basis for design not be available, submit product by listed acceptable manufacturer.
 - h. Architect/Engineer shall be the sole judge of the acceptability of the proposed substitution.
 - i. Review of substitutions shall be at Contractor's expense. Architect/Engineer shall charge the Contractor his standard hourly rates.
 - j. Modification of Contract Documents to accept such substitutions shall be at Contractor's expense. Architect/Engineer shall charge the Contractor his standard hourly rates.
3. Substitutions of products will be considered during bidding only under the following conditions:
- a. Submit a separate request for each Product, supported with complete data, with drawings and samples as appropriate, including:
 1. Comparison of the qualities of the proposed substitution with that specified. Provide data of specified product for comparison.
 2. Changes required in other elements of the work because of the substitution.
 3. Effect on the construction schedule.
 4. Cost data comparing the proposed substitution with the Product specified.
 5. Any required license fees or royalties.
 6. Availability of maintenance service, and source of replacement materials.
 7. Submit a sample of the basis for design and the requested substitution; Samples will not be returned.
 - b. Architect/Engineer shall be the sole judge of the acceptability of the proposed substitution.
 - c. Modifications of contract Documents to accept such substitutions accepted during bidding, should same be used by the Contractor in his bid and presented during the submittal process, shall be charged to the Contractor at the Architect's standard hourly rates.
 - d. Substitutions must be presented to the Architect 15 days prior to the date set for the receipt of bids; telephone requests shall not be accepted. persons requesting substitutions will be notified only by mail, whether request is acceptable; all bidders holding plans during

bidding will receive addenda incorporating acceptable substitutions.

1.7 REUSE OF EXISTING MATERIAL:

- A. Except as specifically indicated or specified, materials and equipment removed from an existing structure shall not be used in the completed work.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 016000

SECTION 017300 - EXECUTION

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 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-installed products.
 - 6. Progress cleaning.
 - 7. Starting and adjusting.
 - 8. Protection of installed construction.
- 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.

DEFINITIONS

- C. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- D. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.

1.3 PREINSTALLATION MEETINGS

- A. Cutting and Patching Conference: Conduct conference at Project site.
 - 1. Prior to commencing work requiring cutting and patching, review extent of cutting and patching anticipated and examine procedures for ensuring satisfactory result from cutting and patching work. Require representatives of each entity directly concerned with cutting and patching to attend, including the following:

- a. Contractor's superintendent.
 - b. Trade supervisor responsible for cutting operations.
 - c. Trade supervisor(s) responsible for patching of each type of substrate.
 - d. Mechanical, electrical, and utilities subcontractors' supervisors, to the extent each trade is affecting by cutting and patching operations.
2. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For professional engineer.
- B. Certificates: Submit certificate signed by professional engineer certifying that location and elevation of improvements comply with requirements.
- C. Cutting and Patching Plan: Submit plan describing procedures at least 5 days prior to the time cutting and patching will be performed. Include the following information:
 1. Extent: Describe reason for and extent of each occurrence of cutting and patching.
 2. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building appearance and other significant visual elements.
 3. Products: List products to be used for patching and firms or entities that will perform patching work.
 4. Dates: Indicate when cutting and patching will be performed.
 5. Utilities and Mechanical and Electrical Systems: List services and systems that cutting and patching procedures will disturb or affect. List services and systems that will be relocated and those that will be temporarily out of service. Indicate length of time permanent services and systems will be disrupted.
 - a. Include description of provisions for temporary services and systems during interruption of permanent services and systems.

1.5 QUALITY ASSURANCE

- A. 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, 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. Electrical wiring systems.
 - k. 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. Equipment supports.
 - d. Piping, ductwork, vessels, and equipment.
 - e. 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.
- B. Manufacturer's Installation Instructions: Obtain and maintain on-site manufacturer's written recommendations and instructions for installation of products and equipment.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- 1. For projects requiring compliance with sustainable design and construction practices and procedures, use products for patching that comply with sustainable design requirements.
- 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.

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, 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. 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.
 - 2. List of detrimental conditions, including substrates.
 - 3. List of unacceptable installation tolerances.
 - 4. Recommended corrections.
- C. 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 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.

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. If discrepancies are discovered, notify Architect promptly.
- B. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.

- C. 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.
- D. 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 INSTALLATION

- A. General: 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.
- 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 the best possible results. 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.
- 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: Where possible, 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.
 - 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. Fit exposed connections together to form hairline joints.
- J. Repair or remove and replace damaged, defective, or nonconforming Work.
 1. Comply with Section 017700 "Closeout Procedures" for repairing or removing and replacing defective Work.

3.5 CUTTING AND PATCHING

- A. Cutting and Patching, 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 according to 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. 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 minimize 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. 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.

3.6 OWNER-INSTALLED PRODUCTS

- A. Site Access: Provide access to Project site for Owner's construction personnel.
- B. Coordination: Coordinate construction and operations of the Work with work performed by Owner's construction personnel.

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 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.

3.7 PROGRESS CLEANING

- A. General: 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 in Finished Areas: 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.

- 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.

3.8 STARTING AND ADJUSTING

- A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.
- C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

3.9 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.

END OF SECTION 017300

SECTION 017310 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 REQUIREMENTS:

- A. Format and content of manuals.
- B. Instruction of Owner's personnel.
- C. Schedule of submittals.

1.2 RELATED REQUIREMENTS:

- A. Shop Drawings, Product Data, and Samples.
- B. Testing, Adjusting, and Balancing of Systems: Test and balance reports.
- C. Section 017000 - Contract Closeout
- D. Warranties and Bonds
- E. Individual Specification Sections: Specific requirements for operation and maintenance data.

1.3 FORMAT:

- A. Prepare data in the form of an instructional manual.
- B. Binders: Commercial quality, 8-1/2 x 11, three-ring binders with hardback, cleanable, vinyl covers.
- C. Cover: Identify each binder with typed or printed title OPERATION AND MAINTENANCE INSTRUCTIONS; list title of Project; use volumes as needed.
- D. Arrange content by systems, process flow, under section numbers and sequence of Table of Contents of this Project Manual.
- E. Provide tabbed fly leaf for each separate project and system, with typed description of product and major component parts of equipment.
- F. Text: Manufacturer's printed data, or typewritten data.

- G. Drawings: Provide with reinforced pocket folders. Bind in with text; fold drawings; insert into pocket folders.

1.4 CONTENTS OF EACH VOLUME:

- A. Table of Contents: Provide title of Project; names, addresses, and telephone numbers of Architect/Engineer and Contractor with name of responsible parties; schedule of products and systems, indexed to content of the volume.
- B. For Each Product or System: List names, addresses and telephone numbers of subcontractors and suppliers, including local source of supplies and replacement parts.
- C. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation; delete inapplicable information.
- D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- E. Warranties and Bonds: Bind in copy of each.

1.5 MANUAL FOR MATERIALS AND FINISHES:

- A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, color and texture designations. provide information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture-protection and Weather-exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation; delete inapplicable information.
- D. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- E. Warranties and Bonds: Bind in copy of each.

1.6 MANUAL FOR MATERIALS AND FINISHES:

- A. Building Products, Applied Materials, and Finishes: Include product data, with catalog number, size, composition, and color and texture designations. Provide information for re-ordering custom manufactured products.
- B. Instructions for Care and Maintenance: Include manufacturer's recommendations for cleaning agents and methods, precautions against detrimental agents and methods, and recommended schedule for cleaning and maintenance.
- C. Moisture-protection and Weather-exposed Products: Include product data listing applicable reference standards, chemical composition, and details of installation. provide recommendations for inspections, maintenance, and repair.
- D. Additional Requirements: As specified in individual Specifications sections.

1.7 MANUAL FOR EQUIPMENT AND SYSTEMS:

- A. Each Item of Equipment and Each System: Include description of unit or system, and component parts. Give function, normal operating characteristics, and limiting conditions. Include performance curves, with engineering data and tests, and complete nomenclature and commercial number or replaceable parts.
- B. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications.
- C. Include as-installed color coded wiring diagrams.
- D. Operating Procedures: include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Include routine procedures and guide for trouble-shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Provide servicing and lubrication schedule, and list of lubricants required.
- G. Include manufacturer's printed operations and maintenance instructions.
- H. Include sequence of operation by controls manufacturer.
- I. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- J. Provide as-installed control diagrams by controls manufacturer.

- K. Provide Contractor's coordination drawings, with as-installed color coded piping diagrams.
- L. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- M. Provide list of original manufacturer's spare parts, current prices, and recommended quantities to be maintained in storage.
- N. Include test and balancing reports as specified.
- O. Additional Requirements: As specified individual specifications sections.
- P. Provide a listing in Table of Contents for design data, with tabbed fly sheet and space for insertion of data.

1.8 INSTRUCTION OF OWNER PERSONNEL:

- A. Before final inspection, instruct Owner's designated personnel in operation, adjustment, and maintenance of products, equipment, and systems, at agreed upon times.
- B. Use operation and maintenance manuals as basis of instruction. Review contents of manual with personnel in detail to explain all aspects of operation and maintenance.
- C. Prepare and insert additional data in Operation and Maintenance Manual when need for such data become apparent during instruction.

1.9 SUBMITTALS:

- A. Submit one (1) copy of completed volumes in final form 15 days prior to final inspection. Copy will be returned after final inspection, with Architect/Engineer comments. Revise content of documents as required prior to final submittal.
- B. Submit three (3) copies of revised volumes of data in final form within ten days after final inspection.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

Not used.

END OF SECTION 017300

SECTION 017400 - WARRANTIES AND BONDS

PART 1 - GENERAL

1.1 REQUIREMENTS:

- A. Preparation and submittal of warranties and bonds.
- B. Schedule of submittals.

1.2 RELATED REQUIREMENTS:

- A. Section of 017000 - Contract Closeout
- B. Individual Specifications Sections: Submit Warranties and Bonds required for specific Products or Work as required by the Contract Documents.

1.3 FORM OF SUBMITTALS:

- A. Bind with operation and maintenance manuals specified in Section 01730.

1.4 PREPARATION OF SUBMITTALS:

- A. Obtain warranties and bonds, executed in triplicate (3) by responsible subcontractors, suppliers, and manufacturer's within ten days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until the Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.

1.5 TIME OF SUBMITTALS:

- A. For equipment or component parts of equipment put into service during construction with Owner's permission, submit documents within ten days after

acceptance.

- B. For items of Work when acceptance is delayed beyond Date of Substantial Completion, submit within ten days after acceptance, listing the date of acceptance as the beginning of the warranty period.

PART 2 - PRODUCTS

Not used.

PART 3 - EXECUTION

3.1 WARRANTY SERVICE

- A. The Contractor shall proceed with warranty repair or replacement within 24 hours of being notified that a warranty deficiency exists.
- B. In order to insure prompt and effective correction of warranty deficiencies, the Contractor shall, if he or any of his Subcontractors do not maintain fully staffed service organizations within Leon County, designate firms within Leon County authorized to perform warranty work on the Contractor's behalf. The name, addresses, and phone numbers of these designated firms shall be included within the closeout documents, along with affidavits signed by officers of the designated firms stating that they have been retained and will perform required warranty service.

END OF SECTION 017400

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.
 - 5. Repair of the Work.
- B. Related Requirements:

1.3 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.

1.4 CLOSEOUT SUBMITTALS

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

1.5 MAINTENANCE MATERIAL SUBMITTALS

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

1.6 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 Owner's signature for receipt of submittals.
 - 5. Submit testing, adjusting, and balancing records.
 - 6. Submit sustainable design submittals not previously submitted.
 - 7. 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.
 - 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.

1.7 FINAL COMPLETION PROCEDURES

A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 012900 "Payment Procedures."
2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
4. Submit pest-control final inspection report.
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.

1.8 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

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

1. Organize list of spaces in sequential order, starting with exterior areas first.
2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

3. Include the following information at the top of each page:

- a. Project name.
- b. Date.
- c. Name of Architect.
- d. Name of Contractor.
- e. Page number.

4. Submit list of incomplete items in the following format:

- a. MS Excel electronic file. Architect will return annotated file.
- b. PDF electronic file. Architect will return annotated file.

1.9 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. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
- D. 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.
- E. 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.
- F. 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.
 - 1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

- A. General: Perform final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.
 - 1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a designated portion of Project:
 - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
 - b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
 - c. 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. Sweep concrete floors broom clean in unoccupied spaces.
 - i. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer's recommendations if visible soil or stains remain.

- j. 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.
 - k. Remove labels that are not permanent.
 - l. Wipe surfaces of mechanical and electrical equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
 - m. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
 - n. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
 - o. 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.
 - p. Clean luminaires, lamps, globes, and reflectors to function with full efficiency.
 - q. Leave Project clean and ready for occupancy.
- C. Pest Control: Comply with pest control requirements in Section 015000 "Temporary Facilities and Controls." Prepare written report.
- D. Construction Waste Disposal: Comply with waste disposal requirements in Section 015000 "Temporary Facilities and Controls."

3.2 REPAIR OF THE WORK

- A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.
- B. Repair, or remove and replace, defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.
 - 1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.
 - 2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.
 - a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.
 - 3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.

4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 017700

SECTION 024119 - SELECTIVE DEMOLITION

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

1.3 DEFINITIONS

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

1.4 MATERIALS OWNERSHIP

- A. Unless otherwise indicated, demolition waste becomes property of Contractor.

- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
 - 1. No historical elements have been discovered at this time. If elements are discovered, carefully salvage in a manner to prevent damage and promptly return to Owner.

1.5 PREINSTALLATION MEETINGS

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

1.6 INFORMATIONAL SUBMITTALS

- A. Proposed Protection Measures: Submit report, including Drawings as required, that indicates the measures proposed for protecting individuals and property for environmental protection, for dust control and for noise control. Indicate proposed locations and construction of barriers.
- B. Schedule of Selective Demolition Activities: Indicate the following:
 - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
 - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
 - 3. Coordination for shutoff, capping, and continuation of utility services.
 - 4. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- C. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations.
- D. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

- A. Inventory: Submit a list of items that have been removed and salvaged.

1.8 FIELD CONDITIONS

- A. Owner's tenant will occupy the building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's tenant operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
 - 1. Before selective demolition, Owner will remove the following items:
 - a. None at this time.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: Present in buildings and structures to be selectively demolished. A report on the presence of hazardous materials has not been issued. If the contractor becomes aware of locations where hazardous materials are present, notify the Architect of Record.
 - 1. Do not disturb hazardous materials or items suspected of containing hazardous materials except under procedures specified elsewhere in the Contract Documents.
 - 2. Owner will provide material safety data sheets for suspected hazardous materials that are known to be present in buildings and structures to be selectively demolished because of building operations or processes performed there.
- E. Historic Areas: Demolition and hauling equipment and other materials shall be of sizes that clear surfaces within historic spaces, areas, rooms, and openings, including temporary protection, by 12 inches or more.
- F. Storage or sale of removed items or materials on-site is not permitted.
- G. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
 - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.9 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:
 - 1. There are no existing warranties that the Architect has been made aware of.
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.10 COORDINATION

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

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

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Perform an engineering survey of condition of building to determine whether removing any element might result in structural deficiency or unplanned collapse of any portion of structure or adjacent structures during selective building demolition operations.
 - 1. Perform surveys as the Work progresses to detect hazards resulting from selective demolition activities.
- D. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- E. Survey of Existing Conditions: Record existing conditions by use of preconstruction photographs or video.
 - 1. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
 - 2. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.
 - 1. Arrange to shut off utilities with utility companies.
 - 2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
 - 3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
 - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
 - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
 - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
 - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
 - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
 - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
 - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

3.3 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
 - 1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
 - 2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
 - 3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
 - 4. Cover and protect furniture, furnishings, and equipment that have not been removed.
 - 5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and

finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.

1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

3.4 SELECTIVE DEMOLITION, GENERAL

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

1. Clean and repair items to functional condition adequate for intended reuse.
 2. Pack or crate items after cleaning and repairing. Identify contents of containers.
 3. Protect items from damage during transport and storage.
 4. Reinstall items in locations indicated. Comply with installation requirements for new materials and equipment. Provide connections, supports, and miscellaneous materials necessary to make item functional for use indicated.
- E. Existing Items to Remain: Protect construction indicated to remain against damage and soiling during selective demolition. When permitted by Architect, items may be removed to a suitable, protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

3.5 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch (19 mm) at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings.
- F. Roofing: Remove no more existing roofing than what can be covered in one day by new roofing and so that building interior remains watertight and weathertight.
1. Remove existing roof membrane, flashings, copings, and roof accessories.
 2. Remove existing roofing system down to substrate.

3.6 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove demolition waste materials from Project site
1. Do not allow demolished materials to accumulate on-site.
 2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.
 3. Remove debris from elevated portions of building by chute, hoist, or other device that will convey debris to grade level in a controlled descent.
- B. Burning: Do not burn demolished materials.

3.7 CLEANING

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

END OF SECTION 024119

SECTION 031000 – CONCRETE FORMWORK

PART 1 - GENERAL

1.1 DESIGN FORMWORK

- A. Assume all responsibility for the design and engineering of the formwork, as well as its construction and removal.
- B. Design formwork for the loads, lateral pressure, and allowable stresses outlined in Chapter 2, "Guide to Formwork for Concrete", ACI 347, latest edition.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Facing Materials shall be such as to provide the specified surface finish.
- B. Form Coating shall be a field applied chemical concrete release agent capable of preventing bond between poured concrete and the form and shall contain no oil, or shall be factory applied non-absorptive liner. Coat form before reinforcement is placed.
- C. Form Ties shall be broken back at 1-inch from surface of concrete. Tie Cones, 1-inch diameter by 1-inch long, shall be used on all exposed concrete.
- D. Pre-molded Expansion Joint material (E.J.) shall conform to ASTM D1751, "Preformed Expansion Joint Fillers for Concrete Paving and Structural Concrete (non-extruding and resilient bituminous types)".

2.2 FABRICATION

- A. Construct formwork so that concrete surfaces will conform to the tolerance limits specified in Table 4.3.1, "Tolerances for Formed Surfaces", ACI 301, latest edition.
- B. Provide positive means of adjustment (wedges or jacks) of shores and struts to compensate for anticipated deflections and settlement in the Formwork during concrete placing operations.

PART 3 - EXECUTION

3.1 ERECTION OF FORMS

- A. Build forms tight to prevent loss of mortar from the concrete.

- B. Provide clean-out openings at base of pier and wall forms to facilitate cleaning and observation immediately before concrete is placed.
- C. Unless shown otherwise on drawings, corners of concrete members exposed to view after all other finish materials are in place shall be beveled by the use of chamfer strips (maximum ½-inch across the beveled face) placed in the forms. Submit sample for approval before proceeding.
- D. Overlap and hold forms against hardened concrete of a previous placement to prevent offsets or loss of mortar at the construction joint and to maintain a true surface.

3.2 INSTALLATION OF EMBEDDED ITEMS

- A. Install inserts and materials to be cast into concrete.
- B. Set 1-inch deep 24-gage galvanized iron wall slots in all concrete surfaces adjacent to brick or block masonry. Slots shall be set vertical in concrete surfaces and spaced 16-inches on center horizontally. Provide masonry anchors spaced 16-inches on center vertically in each wall slot.
- C. Separate parallel runs of conduit by not less than 1-inch. Do not displace reinforcing bars from positions. No conduit shall be greater than ½ slab thickness. Bury conduit in slabs.
- D. Install Adjustable Wedge Inserts at 32-inches on center in concrete for shelf angles.

3.3 REMOVAL OF FORMS

- A. Horizontal member forms used to support the weight of concrete of structural members shall remain in place until the concrete has gained not less than 2/3 of the specified 28-day strength, or a minimum of 7 days.
- B. Vertical member forms and forms not supporting the weight of concrete shall not be removed in less than 24 hours.

END OF SECTION 031000

SECTION 032000 – CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.1 SUBMITTALS

- A. Submit six copies of shop drawings for the fabrication and placing of reinforcing steel for approval, after being checked and approved by the contractor and before proceeding. Any changes by contractor or Fabricator of contract document details, materials, member sizes, or reinforcement shall be "flagged" on shop drawings accompanied by a written request for authorization and reason for requested change.
- B. Placing plans shall show all dimensions, details, notes, locations, sizes, lengths and each bar mark together with accessories and material belonging to the reinforcing for the concrete.
- C. Schedules shall show all information and be of the same form as those on the contract drawings.
- D. Concrete wall reinforcing shall be shown in elevation.
- E. Detail all reinforcing steel in accordance with the "ACI Detailing Manual", ACI Publication SP-66 (2004), unless otherwise indicated on the drawings.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Reinforcement shall be fabricated from ASTM A615 "Deformed Billet-Steel Bars for Concrete Reinforcement", Grade 60.
- B. Reinforcement to be welded shall be fabricated from ASTM A706 "Low Alloy Steel Deformed Bars for Concrete, Grade 60.
- C. Welded smooth wire fabric (WWF) shall conform to "Specifications for Welded Steel Wire Fabric for Concrete Reinforcement", ASTM A185, and shall be fabricated from plain wire conforming to "Specifications for Cold-Drawn Steel Wire for Concrete Reinforcement", ASTM A82.
- D. Wire bar supports shall conform to the National Bureau of Standards PS7, "Wire Bar Supports for Reinforced Concrete Construction".

2.2 FABRICATION

- A. All hooks shall be bent using the pin diameters and dimensions as "ACI Standard Hooks" in the "Manual of Standard Practice for Reinforced Concrete Construction", CRSI latest edition, unless otherwise shown on the plans.

- B. Reinforcing bars shall not be bent or straightened in a manner that will injure the materials.
- C. Reinforcing bars shall conform to the dimensions shown on the plans and within the fabricating tolerances as shown in the "Manual of Standard Practices for Reinforced Concrete Construction", CRSI latest Edition.

PART 3 - EXECUTION

3.1 PLACEMENT/BAR REINFORCEMENT

- A. Bar reinforcement shall be placed in specified positions in the forms and held in place, before and during the placing of concrete by means of bar supports, to carry the reinforcing bars they support within the following tolerances from the positions shown on the drawings or specified herein:
 - 1. For clear concrete protection and for depth "d" in Flexural members, walls, and compression members where "d" is:
 - a. 8 inches or less – plus or minus 1/4"
 - b. More than 8 inches but less than 24 inches – plus or minus 1/2" , but the cover shall not be reduced by more than one-half of the specified cover.
 - 2. For longitudinal location of bends and end of bars:
 - a. +2 inches except at discontinuous ends of member where tolerance shall be + 1/2 inch.
 - 3. For spacing
 - a. +2 inches except that total number of bars shall not be reduced.
- B. Except as shown otherwise on structural drawings, concrete cover for Reinforcing Bars shall be as follows:
 - 1. Cast against and permanently exposed to earth – 3 inches
 - 2. Exposed to earth or weather – 2 inches
 - 3. Interior formed surfaces:
 - a. Piers and Columns – 1/2 inch
 - b. Beams – 1/2 inch
 - c. Walls – 3/4 inch
 - d. Slabs & Joists – 3/4 inch

- C. “Continuous” bars, unless otherwise indicated on drawings, shall be lapped 36 diameters at splices. Provide corner bars to match primary reinforcing at all corner conditions, including continuous wall footings and grade beams.
- D. Splices not shown in contract documents shall be subject to approval.
- E. Support all reinforcing bars.
- F. Space bar supports a maximum of 4-feet on center with the first support not greater than 2-feet from the ends of the bars. Tie to prevent displacement during the concreting operations. Provide #4 support bars at 48-inches spacing where not supported by perpendicular reinforcement.
- G. Reinforcement shall not be "field" bent after being embedded in hardened concrete except where specifically shown on the drawings.
- H. Set and hold all vertical dowels in footings by template.

3.2 WELDING REINFORCEMENT

- A. The welding of reinforcing bars will be permitted only on approval on the shop drawings by the Architect.
- B. The welding of reinforcing bars at intersections for support purposes, in lieu of tie wire, is prohibited.
- C. The welding of reinforcing bars shall be performed in accordance with "Recommended Practices for Welding Reinforcing Steel, Metal Inserts and Connections for Reinforced Concrete Construction", AWS D 12.1-latest edition, as published by the American Welding Society.
- D. Welders shall be qualified by tests as prescribed in the "Standard Qualification Procedures, “ AWS B 3.0-latest edition, as published by the American Welding Society.

END OF SECTION 032000

SECTION 033000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RESPONSIBILITY AND QUALIFICATIONS

- A. Assume all responsibility for the work, design and engineering of the formwork and the safe support of property adjacent to the work.
- B. Work shall be done by one qualified to install the concrete work in accordance with the drawings and specifications. Minimum requirement for qualification shall be five years' experience with satisfactory completion of at least five similar projects.

1.2 SUBMITTALS

- A. Submit six shop drawings for the fabrication and placing of reinforcing steel after being checked and approved by the Contractor and before proceeding. Submit no "Approved as Corrected" drawings for approval.
- B. Design and submit mix design series along with test data from laboratory or field experience (6 copies) corresponding to the same mix design.
 - 1. Concrete shall have 28 day compressive strength as indicated on the drawings.
- C. Test reports shall show the requirements of ASTM specifications.
- D. Shop Drawings shall be submitted in complete sets of a major area of work, with sheets consecutively numbered.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Formwork: See Section 031000.
- B. Reinforcement: See Section 032000.
- C. Welded Fabric: See Section 032000.
- D. Bar Supports: Section 032000.
- E. Portland Cement: A domestic brand approved by the Architect for color and conforming to the requirements of ASTM C150, low alkali, Type I or Type III.

- F. Fine Aggregate: Conform to ASTM C33 except that the fineness modules shall not be less than 2.1 nor more than 3.1 and the gradation shall be as specified herein below:

<u>Sieve No.</u>	3/8	#4	#8	#16	#30	#50	#100
Total % Passing (By Weight)	100	95-100	80-100	50-85	25-60	10-30	2-10

- G. Coarse Aggregate: Crushed stone or gravel and shall conform to ASTM C33. Size of coarse aggregate shall be as specified herein below:

1. Size #67: (3/4 inch to #4) – for Sections 4” thick and greater
2. Size #7: (1/2 inch to #4) – for Sections less than 4” thick

- H. Water used in mixing concrete shall be clean and fit to drink.

- I. Admixtures:

1. Air-entraining Admixtures: Conform to the requirements of ASTM C260 and shall contain no chloride. Air-entraining shall not be used for interior slabs receiving troweled finishes. Submit certification for approval.
2. Retarding Admixtures: Contain no chloride, shall be free of organic acids or salts of organic acids, shall be compatible with the air-entraining admixture to be used and shall conform to the requirements of ASTM C494, Type B. Submit certification for approval.
3. Water-Reducing Admixtures: Contain no chloride, shall be free of organic acids, or salts of organic acids, shall be compatible with the air-entraining admixture to be used and shall conform to the requirements of ASTM C494, Type A, water-reducing normal-setting admixture and, ASTM C494, Type D, water-reducing and retarding admixture. Submit certification for approval.
4. Water-Reducing, High Range (WRHR) Admixtures: Shall contain no chloride, shall be free of organic acids or salts of organic acids, shall be compatible with the air-entraining admixture to be used, and shall conform to the requirements of ASTM C494, Type F or G. Submit certification for approval.
5. High, early strength accelerating, water-reducing admixture: contains no chloride, shall be free of organic acids, shall be compatible with air-entraining admixtures to be used and shall conform to the requirements of ASTM C494, Type C or F. Submit certification for approval
6. Provide technical field service during initial pours at no cost to the Owner by one experienced in the adjustment of concrete mixes for the particular admixtures being used.

- J. Waterproof Curing Paper: Conform to ASTM C171

- K. Curing Compound: Contain no wax or varnish. Conform to ASTM C309, Type I, and Filor by West Chemical Products, Inc., Kure-N-Seal by Sonneborn-Contech, Inc., Clear Bond by Guardian Chemical Corp., Mr. Klear Seal by Castle Chemical Company, or Sealtight CS-309.

- L. Expansion Joint Material in the Building: Non-extruding and resilient non-bituminous type conforming to ASTM D1752, Type II.
- M. Dovetail Anchor Slots for Brick and Block Against Concrete: 1" x 1" 24 gage galvanized steel with drip type corrugated 16 gage galvanized steel anchors, Hohmann and Barnard, Inc., No. 305 with No. 303 anchor, Richmond Screw Anchor Co., Inc., No. 051F with 020 anchor, or Hackman Building Products No. 100 with No. 108 anchors.

2.2 PROPORTIONING

- A. Proportion ingredients for each class of concrete by weight when the slump is the maximum permitted to produce an average compressive strength at 28 days which exceeds the specified compressive strength in accordance with Chapter 5, Section 5.3 of the Building Code Requirements for Reinforced Concrete (ACI-318-95).
- B. Air content of freshly mixed, air-entrained concrete as determined by the method of ASTM C 173 shall be 5%. A field tolerance of 1%+ is acceptable. All exterior concrete, exposed to the weather, shall be air entrained. Interior concrete shall not be air entrained.
- C. Water-reducing admixture shall be used in all concrete to reduce the total water requirement per cubic yard of concrete without loss of workability, and produce an increased strength proportional to the water/cement ratio. During ambient temperatures of 75 F or below use normal setting, water-reducing admixture meeting ASTM C484, Type A. During ambient temperatures of 75 F and above use set-retarding, water-reducing admixture meeting ASTM C494, Type B and Type D. During ambient temperatures of 60 F and below use a high, early strength accelerating water-reducing admixture meeting ASTM C494, Type C and Type E.
- D. The mixes shall be designed to secure concrete having the following consistency range in slump:

<u>Type of Construction</u>	<u>Slump Range (Inches)</u>
Reinforcement Foundations	2-3
Elevated, Structural Slabs	2-4
Sidewalks, Driveways & Slabs-on-Grade	2-4

2.3 BATCHING AND MIXING

- A. Measure cement by weight on a scale separate from those used for other materials. Cement may be measured in bags of standard weight of 94 pounds; however, no fraction of a bag shall be used in any batch.
- B. Measure aggregates by weight. Batch weights shall be based on saturated surface dry materials corrected for the actual moisture condition of the aggregate.

- C. Measure water by volume or by weight by devices not subject to variation due to variable pressure in the water supply line. Measuring tanks shall be provided with means for checking their calibration.
- D. Devices for measuring quantities of cement, aggregates, water and admixtures shall be accurate within 1% under operating condition.
- E. Furnish deliver ticket for each batch of concrete before unloading at the site. Weights of fine and coarse aggregate, amount of cement, and total water as batches shall be printed on ticket by an automatic printing device or shall be recorded and initialed by an employee of the Contractor stationed at the batch plant. Delivery ticket shall, in addition, include the following:
 - 1. Name of batch plant.
 - 2. Serial number of ticket.
 - 3. Date and truck number.
 - 4. Name of contractor.
 - 5. Job name and location.
 - 6. Class of concrete and slump.
 - 7. Cubic yards of concrete.
 - 8. Time loaded.
 - 9. Amount water added at job.
 - 10. Initials of job superintendent.
- F. Ready-mixed concrete shall be produced and delivered in accordance with the requirements of ASTM C94.

PART 3 - EXECUTION

3.1 RESHORING

- A. Concrete elements shall not be permitted to deflect load during form stripping.
- B. After forms are removed, slabs, beams and girders over ten feet in span and cantilevers over four feet shall be reshored for the remainder of the 28-day period. Concrete elements shall not be permitted to deflect or accept load during reshoring operations.
- C. Reshoring operations shall be performed so that existing concrete members are not subject to overloads, eccentric loading, or reverse bending.
- D. Reshoring elements shall have the same capabilities as original shoring, and shall be wedged to provide solid bearing and support. Bracing shall be provided.

3.2 PLACING CONCRETE

- A. Give the Architect 48 hours advance notice before placing concrete in any portion of the structure to permit inspection of the forms and reinforcement. Embedded items of whatever nature shall be in place prior to inspection. An authorization of the Architect shall be secured before concrete is placed.
- B. Remove water and debris from forms before depositing concrete.
- C. Clean reinforcement and forms coated with foreign material or with concrete from previous placing operations before depositing concrete.
- D. Place concrete not later than 1-1/2 hours after mixing. Mix temperature shall not exceed 90 F at time of placing.
- E. Construction joints shall be keyed and bulkheaded vertically and located at the center of span.
- F. Internal type mechanical vibrators and hand spading shall be used to consolidate the concrete.
- G. Concrete shall not be placed within twenty-five feet of workmen placing or securing reinforcement.
- H. Place no concrete when the atmospheric temperature is below 35 F. After concrete has been placed, if the temperature drops below 35 F, conform to paragraph 3.06, Curing and Protection.

3.3 FINISHING FORMED SURFACES

- A. Rough form finish shall be confined to all concrete surfaces not exposed to public view. After removal of forms, tie holes and defects shall be patched. Fins exceeding 1/4" in height shall be chipped off or rubbed off. Otherwise, surfaces shall be left with the texture imparted by the forms.
- B. Smooth form finish shall be used for all concrete surfaces exposed to public view. Form facing material shall produce a smooth, hard, uniform texture on the concrete. Form material with raised grain, torn surfaces, worn edges, patches, or dents which will impair the textures of the concrete surface shall not be used. Tie holes and defects shall be patched. All fins shall be removed.

3.4 REPAIR OF DEFECTS

- A. Inspection by the Architect shall determine whether or not work is acceptable; and, if repairable, the method of repair to be used. Defects in materials and workmanship shall be subject to the above inspection at all times during the progress of the work regardless of previous inspections.
- B. Condemned work shall consist of any concrete work which cannot be repaired. Condemned work shall be removed and replaced, at the Contractor's expense, with work that will conform to the contract documents.

- C. Repair surface defects which are 1/2 inch or less in depth including tie holes by patching the same working day the forms are removed. Cut back defect at 90 degrees to the surface to sound concrete and at least 1" without feather edges. After soaking with water, pack a stiff mortar in the defect. In exposed concrete the mortar mix shall be determined by trial method using a mixture of white and grey portland cement to produce the described color. After mortar has attained its initial set, the patch shall be scraped or rubbed flush with the concrete and match the color and texture of the adjoining surface.

3.5 SLABS

- A. Edge forms and intermediate screed strips shall be set to produce the designated elevations and contours of the finished surface. As a minimum, maintain the concrete thicknesses shown on the drawings.
- B. Insure that termite treatment shall have been completed before installing vapor barrier. Install vapor barrier with 6" laps sealed with the manufacturer's recommended sealing compound.
- C. Place and consolidate to produce a surface within tolerances. Test for grade (or level) and correct by removing excess or adding and compacting additional concrete. These operations must be performed before bleeding water has an opportunity to collect on the surface.
- D. Where metal forms are used at joints, the edge of the form shall be flush with the surface of the concrete. Where saw-cut joints are specified herein, cutting shall be started as soon as the concrete has hardened to prevent aggregates being dislodged by the saw, and shall be completed before shrinkage stresses become sufficient to produce cracking.
- E. Scratched finish shall be applied to surfaces intended to receive bonded applied cementitious applications. Depress slabs as specified for applied finish. All pitches to drains shall be made in the concrete slab and not the setting bed. Level to a Class C tolerance and roughen surface with stiff brushes or rakes before final set. Before the concrete has fully hardened remove laitance and loose aggregate from the surface.
- F. Troweled finish shall be applied to floors intended as walking surfaces or to receive contact floor coverings. Surface shall first be float-finished as specified above. It shall next be power troweled, and finally hand troweled. Final troweling shall be complete when a ringing sound is produced as the trowel is moved over the surface. The finished surface shall be free of trowel marks, uniform in texture and appearance, and shall be planed to a Class A tolerance, except tolerance for concrete on metal deck shall be Class B. Any defects of sufficient magnitude to show through floor covering shall be removed by grinding or patching.
- G. Tolerance for finish surfaces shall be determined by a straight edge placed anywhere on the surface in any direction and shall be true planes within the following limitations:
 - 1. Class A – 1/8 inch in 10 feet;
 - 2. Class B – 1/4 inch in 10 feet;
 - 3. Class C – 1/4 inch in 2 feet;

3.6 CURING AND PROTECTION

- A. Immediately after placement, concrete shall be protected from premature drying, temperatures above or below the range recommended in ACI 305R, latest edition, and 306R, latest edition, and mechanical injury.
- B. Cure all surfaces for a period of 7 days and until average compressive strength has reached 70% of specified strength. Curing shall be by ponding, moist curing with sand or absorptive mats kept continuously wet, continuous application of steam (not exceeding 105 F) or mist spray, waterproof curing paper or liquid membrane forming curing compound. Selection of curing method shall be compatible with the finish to be applied to the concrete surface.
- C. Use curing compound directly from the container without dilution and apply not later than one hour after final finishing in one coat at a coverage not to exceed 200 S.F. per gallon for surfaces with a "floated" or "broom" finish, or 300 S.F. per gallon for surfaces with a "troweled" finish. Submit engineering testing laboratory certification for approval. Do not use curing compound on surfaces to receive mortar beds for tile work.
- D. Cold weather protection shall be in accordance with recommended practices of ACI 306R, latest edition. Whenever the mean daily outdoor temperature is less than 40 F, the temperature of the concrete shall be maintained between 50 F and 70 F for the curing period.
- E. Hot weather protection shall be in accordance with ACI 305R, latest edition. When the anticipated ambient air temperature exceeds 80 F during placing or finishing operations, a retarding admixture shall be used in the mix to retard the setting time of the concrete.

3.7

- A. Contractor shall submit to the Architect the concrete materials and the concrete mix designs proposed for use with a written request for review. Submittal shall include the results of all testing performed to qualify the materials and to establish the mix designs. Place no concrete in the work until mix design has been reviewed.
- B. Contractor shall sample, mould, initially cure, and transport to the laboratory the acceptance test specimens for testing. During the first 24 hours after molding he shall provide means for maintaining the temperature immediately adjacent to the specimens within the range of 60 F to 80 F and prevent loss of moisture from the specimens. After the initial curing period the acceptance test specimens shall be transported in a damp condition to the laboratory in a manner to prevent damage to the specimens. Include information for reporting of test data.
 - 1. Slump and air content shall be determined at the beginning of each day's pour and for each batch of concrete sampled for compressive strength tests. Make corrections to the mix if slump, unit weight, or air content are not within the specified tolerances. Slump and air content shall be determined by ASTM C143 and ASTM C173 respectively.
 - 2. Make sets of four acceptance cylinders for strength testing for each 50 yards of concrete or fraction thereof for each class and strength for each day's concreting which shall be molded from concrete samples taken at random over the duration of the pour.

3. Samples of concrete for strength testing shall be representative of the concrete in-place in the structure and shall not be taken from the first one-third of the concrete of the ready-mix truck. **No water shall be added to the concrete after samples of concrete for strength testing have been secured.**
4. Acceptance test cylinders shall be molded and cured in accordance with ASTM C31 from concrete samples in accordance with ASTM C172
5. Provide designated testing laboratory with all field data specified to be included on concrete test reports in paragraph 3.08.
6. Field sampling and testing shall be performed by ACI Certified Technicians.

3.8 LABORATORY DUTIES IN TESTING

- A. Designated testing laboratory shall perform all operations of testing materials, concrete and verifying mix designs.
- B. Concrete test reports shall include the following:
 1. Class and strength concrete.
 2. Slump.
 3. Air content.
 4. Temperature of concrete mix at time of placement.
 5. Date and time of molding.
 6. Date and age of test specimens.
 7. Location of concrete in the structure.
 8. Delivery ticket serial numbers.
- C. Furnish five (5) copies of all test reports to the Architect.
- D. Designated testing laboratory shall be selected by the Architect and paid by the Owner.

3.9 STRENGTH TESTING AND EVALUATION

- A. For each set of acceptance test cylinders, one cylinder shall be broken at the age of 7 days for information and two cylinders shall be broken at the age of 28 days for acceptance. The remaining cylinder shall be held by the laboratory for 120 days for use as a verification cylinder if required. Test in accordance with ASTM C39, latest edition.
- B. Concrete shall be considered "Questionable Concrete" where any of the following test evaluations occur:

1. Individual test strength is more than 500 psi below specified strength; or
2. Average of any three consecutive strength tests are less than specified strength; or
3. Individual test strength is less than specified strength and the concrete represented by the test is for concrete for a "critical" area of the structure. Critical areas of the structure are those areas which, in the opinion of the Architect, are critical to the structural stability of the structure as a whole.

3.10 QUESTIONABLE CONCRETE

- A. Core tests shall be made at no cost to the government, and as directed by the Architect. If core tests fail to demonstrate the test strength required by the contract documents, or if they are impractical to obtain, and structural analysis does not confirm the safety of the structure, the Architect may, at his discretion, condemn the work or require load tests or additional construction. Should structural analysis confirm the safety of the structure, the Architect may, at his discretion, accept the questionable concrete in accordance with the Article of the General Conditions for the Acceptance of Defective Non-Conforming Work.
- B. The Contractor shall pay all costs incurred in providing the additional testing or analysis to resolve the acceptability of questionable concrete.
- C. The term "Building Official" in ACI Building Code 318 shall be deemed to mean, and does mean, the Architect.

3.11 CORE TESTS

- A. Three representative cores shall be taken from each member or area of concrete for each test considered "questionable". Location of cores shall be as directed by the Architect to least impair the strength of the structure. Damaged cores shall be replaced.
- B. Cores shall be obtained and tested in accordance with ASTM C42, latest edition except that if concrete in the structure will be dry under service conditions, the cores shall be air dried (temperature 60 F to 80 F, and relative humidity less than 60%) for 7 days before test and shall be tested dry. If the concrete in the structure will be more than superficially wet under service conditions, the cores shall be immersed in water for at least 48 hours and tested wet.
- C. Concrete in the questionable area will be considered structurally acceptable if the average of the cores is equal to or greater than 90% of the specified strength and no single core is more than 500 psi below specified strength.

3.12 LOAD TESTS AND ADDITIONAL CONSTRUCTION

- A. Load tests shall be applied and their results evaluated in accordance with Chapter 20 of ACI Building Code 318, latest edition.
- B. Work judged inadequate by results of a load test shall be reinforced with additional construction if so directed by the Architect or shall be replaced.

- C. Additional construction and replaced work shall be at the Contractor's expense.

3.13 CONDUIT WORK

- A. Electrical conduits shall be buried in concrete slabs. Low conduit shall be wired to the upper side of bottom reinforcing and top conduit shall be wired to the lower side of top steel.
- B. Take care in spacing concrete around gangs or parallel conduit. Where such conduits occur, they shall be separated by at least one inch.

END OF SECTION 033000

SECTION 042000 - UNIT MASONRY

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. Concrete masonry units.
 - 2. Clay face brick.
 - 3. Mortar and grout.
 - 4. Steel reinforcing bars.
 - 5. Masonry-joint reinforcement.
 - 6. Ties and anchors.
 - 7. Embedded flashing.
- B. Related Requirements:
 - 1. Section 071113 "Bituminous Dampproofing" for water dampproofing applied to unit masonry assemblies.

1.3 DEFINITIONS

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

1.4 PREINSTALLATION MEETINGS

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

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples for Initial Selection:
 - 1. Clay face brick, in the form of straps of five or more bricks.

1.6 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of the following:
1. Masonry units.
 - a. For brick, include size-variation data verifying that actual range of sizes falls within specified tolerances.
 - b. For exposed brick, include test report for efflorescence according to ASTM C 67.
 2. Cementitious materials. Include name of manufacturer, brand name, and type.
 3. Mortar admixtures.
 4. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
 5. Grout mixes. Include description of type and proportions of ingredients.
 6. Joint reinforcement.
 7. Anchors, ties, and metal accessories.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
 2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.
- C. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.
- D. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

1.7 QUALITY ASSURANCE

- A. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects.
1. Build sample panels for typical exterior and interior walls in sizes approximately 60 inches (1500 mm) long by 48 inches (1200 mm) high by full thickness.
 2. Where masonry is to match existing, build panels adjacent and parallel to existing surface.
 3. Clean one-half of exposed faces of panels with masonry cleaner indicated.
 4. Protect approved sample panels from the elements with weather-resistant membrane.

5. Approval of sample panels is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; aesthetic qualities of workmanship; and other material and construction qualities specifically approved by Architect in writing.
 - a. Approval of sample panels does not constitute approval of deviations from the Contract Documents contained in sample panels unless Architect specifically approves such deviations in writing.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If units become wet, do not install until they are dry.
- B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.
- D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.
- E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.9 FIELD CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
 1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls, and hold cover securely in place.
 2. Where one wythe of multiwythe masonry walls is completed in advance of other wythes, secure cover a minimum of 24 inches (600 mm) down face next to unconstructed wythe, and hold cover in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
 2. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.
- E. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2.2 UNIT MASONRY, GENERAL

- A. Masonry Standard: Comply with TMS 602/ACI 530.1/ASCE 6, except as modified by requirements in the Contract Documents.
- B. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated. Do not use units where such defects are exposed in the completed Work.

2.3 CONCRETE MASONRY UNITS

- A. CMUs: ASTM C 90.
1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi (14.8 MPa).
 2. Density Classification: Lightweight.

3. Size (Width): Manufactured to dimensions 3/8 inch (10 mm) less than nominal dimensions.

2.4 BRICK

- A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units:
 1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
 2. Provide special shapes for applications where shapes produced by sawing would result in sawed surfaces being exposed to view.
- B. Clay or Concrete Face Brick or Brick Paver: Facing brick complying with ASTM C 216.
 1. Brick Allowance – Allow \$2,500.00 per thousand; color and texture to be selected by Architect.
 2. Grade: SW.
 3. Type: FBS.
 4. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 3000 psi (20.6 MPa).
 5. Initial Rate of Absorption: Less than 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C 67.
 6. Efflorescence: Provide brick that has been tested according to ASTM C 67 and is rated "not effloresced."
 7. Size (Actual Dimensions): 3-5/8 inches (92 mm) wide by 2-1/4 inches (57 mm) high by 7-5/8 inches (194 mm) long.

2.5 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
 1. Alkali content shall not be more than 0.1 percent when tested according to ASTM C 114.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Masonry Cement: ASTM C 91/C 91M.

- E. Mortar Cement: ASTM C 1329/C 1329M.
- F. Aggregate for Mortar: ASTM C 144.
 - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
- G. Aggregate for Grout: ASTM C 404.
- H. Water: Potable.

2.6 REINFORCEMENT

- A. Uncoated-Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).
- B. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
 - 1. Exterior Walls: Hot-dip galvanized carbon steel.
 - 2. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
 - 3. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.
 - 4. Wire Size for Veneer Ties: 0.148-inch (3.77-mm) diameter.
 - 5. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (407 mm) o.c.
 - 6. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.
- C. Masonry-Joint Reinforcement for Single-Wythe Masonry: Ladder or truss type with single pair of side rods.

2.7 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into veneer but with at least a 5/8-inch (16-mm) cover on outside face.
- B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:
 - 1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M, with ASTM A 153/A 153M, Class B-2 coating.
 - 2. Stainless-Steel Sheet: ASTM A 240/A 240M or ASTM A 666, Type 304, Type 316.
 - 3. Stainless-Steel Bars: ASTM A 276 or ASTM A 666, Type 304.
- C. Individual Wire Ties: Rectangular units with closed ends and not less than 4 inches (100 mm) wide.

1. Wire: Fabricate from 3/16-inch- (4.76-mm-) diameter, hot-dip galvanized steel wire.
- D. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.35 mm) thick by 24 inches (610 mm) long, with ends turned up 2 inches (51 mm) or with cross pins unless otherwise indicated bent to configuration indicated.

1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

2.8 EMBEDDED FLASHING MATERIALS

- A. Flexible Flashing: Use one of the following unless otherwise indicated:
1. Copper-Laminated Flashing: 5-oz./sq. ft. (1.5-kg/sq. m) copper sheet bonded between two layers of glass-fiber cloth. Use only where flashing is fully concealed in masonry.

2.9 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.
- B. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).
- C. Weep/Cavity Vent Products: Use one of the following unless otherwise indicated:
1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe, in color selected from manufacturer's standard.
- D. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
1. Configuration: Provide one of the following:
 - a. Strips, not less than 3/4 inch (19 mm) 1-1/2 inches (38 mm) thick and 10 inches (250 mm) high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.

2.10 MASONRY CLEANERS

- A. Proprietary Acidic Cleaner: Manufacturer's standard-strength cleaner designed for removing mortar/grout stains, efflorescence, and other new construction stains from new masonry without discoloring or damaging masonry surfaces. Use product expressly

approved for intended use by cleaner manufacturer and manufacturer of masonry units being cleaned.

2.11 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
 - 1. Do not use calcium chloride in mortar or grout.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
 - 1. For masonry below grade or in contact with earth, use Type M.
 - 2. For reinforced masonry, use Type M.
 - 3. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
 - 4. For interior nonload-bearing partitions, Type O may be used instead of Type N.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
 - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
 - 2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi (14 MPa).
 - 3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) 10 to 11 inches (250 to 280 mm) as measured according to ASTM C 143/C 143M.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 INSTALLATION, GENERAL

- A. Thickness: Build cavity and composite walls and other masonry construction to full thickness shown. Build single-wythe walls to actual widths of masonry units, using units of widths indicated.
- B. Build chases and recesses to accommodate items specified in this and other Sections.
- C. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- D. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.
- E. Select and arrange units for exposed unit masonry to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.
- F. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds 30 g/30 sq. in. (30 g/194 sq. cm) per minute when tested according to ASTM C 67. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

- A. Dimensions and Locations of Elements:
1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (12 mm) or minus 1/4 inch (6 mm).
 2. For location of elements in plan, do not vary from that indicated by more than plus or minus 1/2 inch (12 mm).
 3. For location of elements in elevation, do not vary from that indicated by more than plus or minus 1/4 inch (6 mm) in a story height or 1/2 inch (12 mm) total.

B. Lines and Levels:

1. For bed joints and top surfaces of bearing walls, do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2-inch (12-mm) maximum.
2. For conspicuous horizontal lines, such as lintels, sills, parapets, and reveals, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2-inch (12-mm) maximum.
5. For lines and surfaces, do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2-inch (12-mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet ((6 mm in 3 m),) or 1/2-inch (12-mm) maximum.
7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than 1/16 inch (1.5 mm) except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm). Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch (3 mm).
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than 1/16 inch (1.5 mm) from one masonry unit to the next.

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in a running bond; do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.

- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 2 inches (50 mm). Bond and interlock each course of each wythe at corners. Do not use units with less-than-nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- D. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below, and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow brick and CMUs as follows:
 - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
 - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
 - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
 - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
 - 5. Fully bed units and fill cells with mortar at anchors and ties as needed to fully embed anchors and ties in mortar.
- B. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- C. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.
- D. Cut joints flush where indicated to receive dampproofing and cavity wall insulation.

3.6 COMPOSITE MASONRY

- A. Bond wythes of composite masonry together as follows:

1. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where bed joints of both wythes do not align, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties.
- B. Corners: Provide interlocking masonry unit bond in each wythe and course at corners unless otherwise indicated.
 1. Provide continuity with masonry-joint reinforcement at corners by using prefabricated L-shaped units as well as masonry bonding.
- C. Intersecting and Abutting Walls: Unless vertical expansion or control joints are shown at juncture, bond walls together as follows:
 1. Provide continuity with masonry-joint reinforcement by using prefabricated T-shaped units.

3.7 CAVITY WALLS

- A. Bond wythes of cavity walls together as follows:
 1. Masonry-Joint Reinforcement: Installed in horizontal mortar joints.
 - a. Where bed joints of both wythes align, use ladder-type reinforcement extending across both wythes.
 - b. Where bed joints of wythes do not align, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties.
 - c. Where one wythe is of clay masonry and the other of concrete masonry, use adjustable-type (two-piece-type) reinforcement with continuous horizontal wire in facing wythe attached to ties to allow for differential movement regardless of whether bed joints align.
- B. Keep cavities clean of mortar droppings and other materials during construction. Bevel beds away from cavity, to minimize mortar protrusions into cavity. Do not attempt to trowel or remove mortar fins protruding into cavity.

3.8 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
 1. Space reinforcement not more than 16 inches (406 mm) o.c.

- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.
- E. Cut and bend reinforcing units as directed by manufacturer for continuity at corners, returns, offsets, column fireproofing, pipe enclosures, and other special conditions.

3.9 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
 - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout, and rake out joints in exposed faces for application of sealant.
 - 2. Install preformed control-joint gaskets designed to fit standard sash block.
 - 3. Install interlocking units designed for control joints. Install bond-breaker strips at joint. Keep head joints free and clear of mortar, or rake out joint for application of sealant.
 - 4. Install temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

3.10 FLASHING, WEEP HOLES, AND CAVITY VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated. Install cavity vents at shelf angles, ledges, and other obstructions to upward flow of air in cavities, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
 - 1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
 - 2. At multiwythe masonry walls, including cavity walls, extend flashing through outer wythe, turned up a minimum of 8 inches (200 mm), and through inner wythe to within 1/2 inch (13 mm) of the interior face of wall in exposed masonry. Where interior face of wall is to receive furring or framing, carry flashing

completely through inner wythe and turn flashing up approximately 2 inches (50 mm) on interior face.

3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
 4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.
 5. Cut flexible flashing off flush with face of wall after masonry wall construction is completed.
- C. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.
1. Use specified weep/cavity vent products to form weep holes.
 2. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.
- D. Place cavity drainage material in cavities to comply with configuration requirements for cavity drainage material.

3.11 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and that of other loads that may be placed on them during construction.
- B. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
1. Comply with requirements in TMS 602/ACI 530.1/ASCE 6 for cleanouts and for grout placement, including minimum grout space and maximum pour height.
 2. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

3.12 REPAIRING, POINTING, AND CLEANING

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

3.13 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.

END OF SECTION 042000

SECTION 051200 - STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 SECTION INCLUDES

- A. Section includes fabrication and erection of structural steel indicated in the Contract Documents or otherwise required for proper completion of the work.

1.2 RELATED SECTIONS

1.3 REFERENCES

- A. AISC – Code of Standard Practice for Steel Buildings and Bridges
- B. AISC – Load and Resistance Factor Design (LRFD) Specification for Structural Steel Buildings.
- C. AISC – Specifications of Structural Joints using ASTM A325 or A490 bolts approved by the Research Council in Structural Connections.
- D. AWS D1.1 – Structural Welding Code.
- E. AWS A5.1 – Specification for Carbon Steel Electrodes for Shield Metal Arc Welding.
- F. AWS A5.5 – Specification for Low-Alloy Steel Covered Arc Welding Electrodes.
- G. AWS A5.17 – Specification for Carbon Steel Electrodes and Fluxes for Submerged Arc Welding.
- H. AWS A5.20 – Specification for Carbon Steel Electrodes for Flux Cored Arc Welding.
- I. SSPC – Steel Structures Painting Manual.
- J. ASTM A36 – Standard Specification for Structural Steel.
- K. ASTM A53 – Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded, and Seamless.
- L. ASTM A108 – Standard Specification for Steel Bar, Carbon and Allow, Cold-Finished, Standard Quality.
- M. ASTM A123 – Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
- N. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

- O. ASTM A780 – Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings.
- P. ASTM A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.
- Q. ASTM A325 – Standard Specification for Structural Bolts, Heat Treated, 120/105 KSI Minimum Tensile Strength.
- R. ASTM A490 – Standard Specification for Heat-Treated Steel Structural Bolts, 150 KSI Minimum Tensile Strength.
- S. ASTM A500 – Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Tubing in Rounds and Shapes.
- T. ASTM A501 – Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing.
- U. ASTM A572 – Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality.
- V. ASTM A992 – Standard Specification for Steel for Structural Shapes for Use in Building Framing.
- W. ASTM F436 – Standard Specification for Hardened Steel Washers.
- X. ASTM F844 – Standard Specification for Washers, Steel, Plain (Flat), Unhardened for General Use.
- Y. ASTM A6 – Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling.
- Z. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength.
- AA. ASTM A673 – Standard Specification for Sampling Procedure for Impact Testing of Structural Steel.
- BB. ANSI/AISC 341-02 – Seismic Provisions for Structural Steel Buildings.

1.4 SUBMITTALS

- A. Contact Structural Engineer's Construction Administration Division prior to detailing structural steel shop drawings.
- B. Reproduction of Structural Drawings for shop drawings is not permitted. Electronic drawing files may be provided to the Contractor at the engineer's discretion.

- C. Submit shop drawings for review.
- D. Shop drawings shall clearly indicate the profiles, sizes, ASTM Grade, spacings and locations of all structural steel members, including connections, attachments, anchorage's, framed openings, sizes and types of fasteners, method of tightening fasteners, cambers, and the number, type and spacing of the headed shear connectors.
- E. For record only, submit written Welding Procedure Specifications (WPS) for each type of welded joint used in accordance with AWS D1.1.
- F. Maintain at construction office mill certification that the steel supplied meets the specifications.
- G. Maintain at construction office certification that high strength bolts supplied meet the specifications.
- H. Submit certification that the fabricator meets the required qualifications and ultrasonic testing reports for complete penetration welds. If fabricator has to have an independent testing agency to inspect fabrication as required by these specifications, submit the name and qualifications of the independent testing agency.
- I. Submit certification that the erector meets the required qualifications.
- J. Upon request, submit the erection sequence and procedures to be used by the steel erector.
- K. Upon request, submit shop measurements for camber.

1.5 QUALITY ASSURANCE

A. Headed Studs

- 1. Inspection and testing shall be in accordance with AWS D1.1
- 2. The inspector shall verify the pre-production testing in accordance with Section 7.7.1 of AWS D1.1.
- 3. The inspector shall perform periodic inspection of all headed stud welding.
- 4. Bend tests shall be conducted as required by Section 7.8.1 of AWS D1.1. In addition; a minimum of 5% of all headed studs shall be subjected to bend tests. Retest all studs on any member that has a stud failing the bend test.

1.6 FABRICATOR'S QUALIFICATIONS

- A. Steel fabricator shall be certified by the American Institute of Steel Construction (AISC) Quality Certification Program for Conventional Steel Buildings (Sbd) and, if required by the Building Code, approved by the Building Official. In addition, fabricator shall ultrasonically inspect 100% of the complete penetration welds performed in the shop.

- B. Fabricator not certified by the AISC Quality Certification Program shall have fabrication procedures and fabricated steel tested and inspected by an independent testing agency. Payment of these tests and inspections shall be by the fabricator. Tests and inspections shall be performed by AWS Certified Welding Inspectors. Prior to delivery of structural steel to the project, submit copies of the inspection reports to the Structural Engineer. The purpose of this inspection is to enable the testing/inspection agency to verify that, in general, the steel is being fabricated in accordance with the Contract Documents. A minimum of one trip per week is recommended. The first trip should be scheduled in the early stages of fabrication. Contact Structural Engineer prior to initial inspection. Tests and inspections shall include the following:
1. Examine mill test reports and verify that material being used is the same as the mill test reports.
 2. Review the fabricator's written welding procedures. Verify that the fabricator's welding procedures are being followed. Verify that welders are certified with current papers and that they demonstrate proper techniques.
 3. Observe high strength bolting procedures. Verify that shop installation of high strength bolts conform to AISC specifications.
 4. Camber
 - a. Measure 25% of all cambered steel members (in field) prior to erection for compliance with the AISC Code of Standard Practice. Camber shall be checked at mid-point of member length.
 5. Examine joint preparation for complete penetration joints. Ultrasonically inspect 100% of the complete penetration welds performed in the shop.
 6. Examine fillet welds for proper size, profile, throat, porosity and end returns.
 7. Examine steel members for lamellar tearing. Spot check dimensions and hole sizes.
 8. Examine bolted areas for burrs.

1.7 ERECTOR'S QUALIFICATION

- A. Erector shall be experienced in erecting structural systems similar in complexity to this project as evidenced by 10 completed projects.
- B. Erector shall have a minimum of 5 years experience in the erection of structural steel or is an AISC Certified Advanced Steel Erector.

1.8 STORAGE

- A. Store materials off ground to permit easy access for inspection and identification. Store steel members and packaged items in a manner that provides protection against contact with deleterious materials.

PART 2 - PRODUCTS

2.1 ANCHOR RODS

- A. Anchor rods shall be threaded rods conforming to ASTM F1554 Gr. 36 unless noted otherwise on the drawings. The anchor rods shall be threaded at both ends.
- B. Provide a heavy hexagonal nut threaded and tack welded to the bottom of each rod unless noted otherwise on the structural documents. The nut shall conform to ASTM F844.
- C. Provide two hexagonal nuts and two plain steel washers at the top of each rod. The nuts and washers shall conform to ASTM F844.
- D. Provide 3/8 inch thick plate washers with standard holes in lieu of top steel washers on base plates with oversized holes. Oversized holes are defined as any hole that is larger than a standard hole as defined in Chapter J of the AISC Specification. Recommended base plate holes as given in the AISC Manual are considered oversized holes. The plate washer shall be square and shall be a minimum size of 3/4 inch + the actual hole diameter. Plate washers shall be sized as required to provide a minimum 3/8 inch lap over hole in base plate, but minimum of 3 inch x 3 inch and shall be centered over the hole.

2.2 ROLLED STEEL SHAPES, PLATES, AND BARS

- A. Rolled steel W shapes shall conform to ASTM A992, 50 ksi minimum yield strength, unless noted otherwise on the contract drawings.

ASTM A572, Grade 50 may be substituted for ASTM A992
- B. Rolled steel M, S, HP, C, MC, and L shapes shall conform to ASTM A36, 36 ksi minimum yield strength, unless noted otherwise on the contract drawings.
- C. Plates and Bars shall conform to ASTM A36, 36 ksi minimum yield strength, unless noted otherwise on the contract drawings.

2.3 SQUARE/RECTANGULAR HOLLOW STRUCTURAL STEEL SECTIONS

- A. Square/rectangular hollow structural steel sections shall conform to ASTM A500, Grade B, 46 ksi minimum yield strength.

2.4 ROUND HOLLOW STEEL PIPE

- A. Round hollow steel pipe shall conform to ASTM A53, Grade B, 35 ksi minimum yield strength.

2.5 NON-HIGH-STRENGTH FASTENERS

- A. Non-high-strength bolts shall conform to ASTM A307, Grade A, 60 ksi minimum, where noted on the Structural Drawings.

- B. Hardened steel washers shall conform to ASTM F436.

2.6 HIGH-STRENGTH FASTENERS

- A. High-strength bolts shall conform to ASTM A325 or ASTM A490 as noted on the Structural Drawings.
- B. Provide 3/4 inch minimum diameter bolts, unless noted otherwise.
- C. Hardened steel washers shall conform to ASTM F436.
- D. Spline-type tension control bolts, plain hardened washers and suitable nuts are an acceptable alternate design bolt assembly.
- E. Do not use load indicating washers.

2.7 HEADED STUDS

- A. Headed steel studs shall conform to the requirements of AWS D1.1
- B. Provide 3/4-inch diameter headed steel studs, unless noted otherwise.
- C. Provide heat-resistant ceramic arc shields with studs.

2.8 ROUND RODS

- A. Rods shall conform to ASTM, A36
- B. The rods shall be threaded at each end. The rods shall be smooth for the entire length.

2.9 FORGED STEEL HARDWARE ITEMS

- A. Structural hardware items such as clevises, turnbuckles, sleeve nuts, recessed-pin nuts, and cotter pins shall comply with the dimensions, weights, and design strengths as set forth in tables 15-4 through 15-8 (as applicable) in the AISC Manual of Steel Construction, LRFD, Third edition.
- B. Material shall comply with SAE C-1035, C 1030, or other steel alloy approved equal.

2.10 EXPANSION ANCHORS

- A. Expansion anchors shall be Hilti HSL-3 Heavy Duty Expansion Sleeve Anchors supplied by Hilti Fastening Systems, the Hilti HDA Undercut Anchors supplied by Hilti Fastening Systems, or the Strong Bolt Anchors supplied by Simpson Strong-Tie Co.

2.11 ADHESIVE ANCHORS

- A. Adhesive anchors shall consist of:
 - 1. An all-thread steel anchor conforming to ASTM A307, Grade A or ASTM A36, zinc plated in accordance with ASTM B633, unless noted otherwise on the Structural Drawings, and
 - 2. An adhesive conforming to HIT HY150 injection adhesive (HIT HY20 adhesive for masonry construction with voids) supplied by Hilti Fastening Systems, EPCON System Ceramic 6 epoxy adhesive supplied by ITW Ramset/Red Head, Power-Fast epoxy injection gel supplied by Powers Fastening, Acrylic-Tie adhesive supplied by Simpson Strong-Tie Co., or approved equal.

2.12 WELD ELECTRODES

- A. E-70 series low hydrogen electrodes shall conform to AWS A5.1, A5.5, A5.17, or A5.20.
- B. Properly store electrodes to maintain flux quality.

2.13 PRIMER

- A. Oxide primer shall conform to AISC Specifications, Code of Standard Practice, and SSPC Steel Structure Painting Manual, unless indicated otherwise.
- B. Paint primer shall be free of lead and chromate and shall comply with State and Federal volatile organic compound (VOC) requirements.
- C. Paint primer shall be compatible with finish coating.

2.14 GALVANIZING

- A. Galvanized coating shall conform to ASTM A123.
- B. Galvanize bolts, nuts, and washers in accordance with ASTM A153 when used to connect steel members that are specified to be galvanized.
- C. Expansion anchors or adhesive anchors specified to be galvanized shall be mechanically galvanized in accordance with ASTM B695, Class 65, Type I.

PART 3 - EXECUTION

3.1 GENERAL

- A. Fabricate and erect structural steel in accordance with AISC Specifications and Code of Standard Practice.

- B. Notify Architect/Structural Engineer and Structural Testing/Inspection Agency at least 48 hours prior to structural steel fabrication and erection.

3.2 ANCHOR BOLT (ROD) SETTING

- A. Provide templates for setting anchor bolts (rods). Position anchor bolts (rods) by using templates with two nuts to secure in place prior to placement of concrete.
- B. Do not erect steel where anchor bolt (rod) nuts will not have full threads.

3.3 CONNECTIONS

- A. Provide a minimum of two fasteners at each bolted connection.
- B. Ensure fasteners are lubricated prior to installation.
- C. Provide high-strength bolted connections in accordance with AISC Specifications for Structural Joints using ASTM A325 or A490 Bolts.
- D. Provide connections for expansion and contraction where steel beams connect to concrete walls or concrete columns and at expansion joints. Secure nuts on bolts against loosening. (Dent threads with a chisel.)

3.4 FASTENER INSTALLATION

- A. Bolts shall be installed in holes of the connection and brought to snug tight condition. Tighten connection progressing systematically from the most rigid part to the free edges of the connection to minimize relaxation of the bolts.
- B. High-strength bolts installed shall have a hardened washer under the element turned in tightening.
- C. Installation and tightening of bolts shall conform to the AISC Specifications for Structural Joints.

3.5 HEADED STUDS

- A. Headed studs shall be welded in accordance with AWS D1.1.
- B. Remove shields after welding studs.

3.6 EXPANSION ANCHOR INSTALLATION

- A. Install in accordance with manufacturer's recommendation.
- B. Minimum embedment shall be equal to 6 times the anchor diameter unless noted otherwise.

3.7 ADHESIVE ANCHOR INSTALLATION

- A. Install in accordance with manufacturer's recommendation.
- B. Minimum embedment shall be equal to 9 times the anchor diameter unless noted otherwise.

3.8 WELDING

- A. Comply with AWS Structural Welding Code. Use prequalified weld procedures.
- B. Provide end returns where fillet welds terminate at end or sides. Returns shall be continuous for a distance of not less than two times
- C. Complete penetration joints shall be back gouged to sound metal before the second side is welded or have 1/4 inch root opening with 3/16 x 1 inch backing bar. Access holes are required. Filling access holes is not required.
- D. Remove all slag and weld splatter from deposited weld metal.
- E. Weld access holes shall be as shown on the structural drawings. The weld access hole shall be ground smooth to a surface roughness value not to exceed 500 micro in., and shall be free of notches and gouges. Notches and gouges shall be repaired.

3.9 SPLICING

- A. Splice members only where indicated unless authorized in writing by Structural Engineer.
- B. Provide shim plates at bottom flange splice at continuous beam splices with different depths.

3.10 CUTTING

- A. Do not use flame cutting to correct errors unless authorized in writing.
- B. Re-entrant corners shall have a minimum radius of one inch and be free of notches. Notches and gouges resulting from flame cutting shall be finished to a smooth appearance.

3.11 MILL SCALE

- A. Remove loose mill scale.

3.12 BOLT HOLES

- A. Cut, drill, or punch holes perpendicular to metal surfaces. Do not enlarge holes by burning. Drill or punch holes in bearing plates. Remove burrs.

3.13 PRIMING STEEL

- A. Prime steel that is not encased in concrete, plaster, or sprayed fireproofing. Do not shop prime in areas to be field welded, contact surfaces of slip critical connections, or areas to receive special finishes.
- B. Field prime, as required, steel that has been welded or that is not primed after connections have been tightened.
- C. Verify primer requirements with Architect for building without fireproofing.

3.14 GALVANIZING

- A. Galvanize shelf angles that support the exterior building veneer, for example brick shelf angles.
- B. Galvanize environmentally exposed steel; for example, mechanical equipment supports.
- C. Touch-up welds and abrasions in galvanized members in accordance with ASTM A780.

END OF SECTION 051200

SECTION 061000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Framing with dimension lumber.
2. Framing with engineered wood products.
3. Rooftop equipment bases and support curbs.
4. Wood blocking and nailers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of process and factory-fabricated product.

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements
2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

1.3 INFORMATIONAL SUBMITTALS

A. 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 ALSC Board of Review.

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

1. Wood-preservative-treated wood.
2. Fire-retardant-treated wood.
3. Engineered wood products.
4. Power-driven fasteners.
5. Powder-actuated fasteners.
6. Expansion anchors.
7. Metal framing anchors.

PART 2 - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

A. Certified Wood: Materials shall be produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship for the following:

1. Dimension lumber framing.
2. Parallel-strand lumber.
3. Prefabricated wood I-joists.
4. Rim boards.
5. Miscellaneous lumber.

B. Wall Framing

1. All exterior wall framing, unless noted otherwise, shall be TimberStrand LSL manufactured by Trus Joist Weyerhaeuser or approved alternative
2. All LSL framing shall have a minimum Modulus of Elasticity of 1.3x10⁶ psi.
3. All LSL in contact with concrete shall be treated with StandGuard zinc borate.

C. Roof Framing

1. All primary roof members shall be Trus Joist manufactured by Weyerhaeuser or approved alternative

D. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

1. Factory mark each piece of lumber with grade stamp of grading agency.
2. Provide dressed lumber, S4S, unless otherwise indicated.

E. Maximum Moisture Content of Lumber: 19 percent unless otherwise indicated.

2.2 WOOD-PRESERVATIVE-TREATED LUMBER

A. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium. Do not use inorganic boron (SBX) for sill plates.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
3. Wood floor plates that are installed over concrete slabs-on-grade.

2.3 PLYWOOD BACKING PANELS

- A. Equipment Backing Panels: DOC PS 1, Exterior, AC, fire-retardant treated, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.

2.4 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, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Power-Driven Fasteners: NES NER-272.
- C. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

2.5 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch (25-mm) nominal thickness, compressible to 1/32 inch (0.8 mm); selected from manufacturer's standard widths to suit width of sill members indicated.
- B. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate nailers, blocking, and similar supports to comply with requirements for attaching other construction.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Install fire-retardant treated plywood backing panels with classification marking of testing agency exposed to view.
- E. Shear Wall Panels: Install shear wall panels to comply with manufacturer's written instructions.

- F. Metal Framing Anchors: Install metal framing anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.
- G. Do not splice structural members between supports unless otherwise indicated.
- H. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
- I. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
 - 1. NES NER-272 for power-driven fasteners.
 - 2. Table 2304.9.1, "Fastening Schedule," in FBC's International Building Code.
 - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in FBC's International Residential Code for One- and Two-Family Dwellings.

3.2 PROTECTION

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

END OF SECTION 061000

SECTION 061053 - MISCELLANEOUS ROUGH CARPENTRY

1PART - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:

- 1. Wood blocking, cants, and nailers.

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.

- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:

- 1. NeLMA: Northeastern Lumber Manufacturers' Association.
 - 2. NHLA: National Hardwood Lumber Association.
 - 3. NLGA: National Lumber Grades Authority.
 - 4. SPIB: The Southern Pine Inspection Bureau.
 - 5. WCLIB: West Coast Lumber Inspection Bureau.
 - 6. WWP: Western Wood Products Association.

1.4 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.

- 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
 - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements.

Concord School Renovations

Include physical properties of treated materials based on testing by a qualified independent testing agency.

3. For fire-retardant treatments specified to be High-Temperature (HT) type include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

B. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:

1. Preservative-treated wood.
2. Fire-retardant-treated wood.
3. Power-driven fasteners.
4. Powder-actuated fasteners.
5. Expansion anchors.
6. Metal framing anchors.

1.5 QUALITY ASSURANCE

A. Forest Certification: For the following wood products, provide materials produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship":

1. Miscellaneous lumber.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Stack lumber flat with spacers between each bundle to provide air circulation. Provide for air circulation around stacks and under coverings.

B. Deliver interior wood materials that are to be exposed to view only after building is enclosed and weatherproof, wet work other than painting is dry, and HVAC system is operating and maintaining temperature and humidity at occupancy levels.

2PART - PRODUCTS

2.1 WOOD PRODUCTS, GENERAL

MISCELLANEOUS ROUGH CARPENTRY

A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.

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

2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

A. Preservative Treatment by Pressure Process: AWPAC2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWPAC31 with inorganic boron (SBX).

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.

C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

D. Application: Treat items indicated on Drawings, and the following:

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.

2.3 FIRE-RETARDANT-TREATED MATERIALS

Concord School Renovations

A. General: Comply with performance requirements in AWP A C20 (lumber) and AWP A C27 (plywood).

1. Use treatment that does not promote corrosion of metal fasteners.
2. Use Exterior type for exterior locations and where indicated.
3. Use Interior Type A, High Temperature (HT) for enclosed roof framing, framing in attic spaces, and where indicated.
4. Use Interior Type A, unless otherwise indicated.

B. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.

1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

C. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.

D. Application: Treat all items indicated on Drawings, and the following:

1. All Concealed blocking.

2.4 DIMENSION LUMBER FRAMING

A. Maximum Moisture Content: 15 percent for 2-inch nominal (38-mm actual) thickness or less, 19 percent for more than 2-inch nominal (38-mm actual) thickness.

B. Other Framing: No. 2 grade and any of the following species:

1. Hem-fir (north); NLGA.
2. Southern pine; SPIB.
3. Douglas fir-larch; WCLIB or WWPA.
4. Mixed southern pine; SPIB.
5. Spruce-pine-fir; NLGA.
6. Douglas fir-south; WWPA.
7. Hem-fir; WCLIB or WWPA.
8. Douglas fir-larch (north); NLGA.
9. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.

2.5 MISCELLANEOUS LUMBER

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

MISCELLANEOUS ROUGH CARPENTRY

1. Nailers.

B. For items of dimension lumber size, provide Construction or No. 2 grade lumber with 15 percent maximum moisture content and any of the following species:

1. Hem-fir (north); NLGA.
2. Mixed southern pine; SPIB.
3. Spruce-pine-fir; NLGA.
4. Hem-fir; WCLIB, or WWP.
5. Spruce-pine-fir (south); NeLMA, WCLIB, or WWP.
6. Western woods; WCLIB or WWP.
7. Northern species; NLGA.
8. Eastern softwoods; NeLMA.

C. For concealed boards, provide lumber with 15 percent maximum moisture content and any of the following species and grades:

1. Mixed southern pine, No. 2 grade; SPIB.
2. Hem-fir or hem-fir (north), Construction or 2 Common grade; NLGA, WCLIB, or WWP.
3. Spruce-pine-fir (south) or spruce-pine-fir, Construction or 2 Common grade; NeLMA, NLGA, WCLIB, or WWP.
4. Eastern softwoods, No. 2 Common grade; NELMA.
5. Northern species, No. 2 Common grade; NLGA.
6. Western woods, Construction or No. 2 Common grade; WCLIB or WWP.

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

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

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

2.6 FASTENERS

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

1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.

B. Nails, Brads, and Staples: ASTM F 1667.

Concord School Renovations

C. Power-Driven Fasteners: NES NER-272.

D. Wood Screws: ASME B18.6.1.

E. Screws for Fastening to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.

F. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).

G. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

H. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.

1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

3PART - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking, grounds, and similar supports to comply with requirements for attaching other construction.
- B. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- C. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- E. Do not splice structural members between supports, unless otherwise indicated.

- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
- G. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- H. Comply with AWP A M4 for applying field treatment to cut surfaces of preservative-treated lumber.
1. Use inorganic boron for items that are continuously protected from liquid water.
 2. Use copper naphthenate for items not continuously protected from liquid water.
- I. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
1. NES NER-272 for power-driven fasteners.
 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
 3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.
 4. Table 2305.2, "Fastening Schedule," in BOCA's BOCA National Building Code.
 5. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
 6. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
 7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.
- J. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.

3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.

- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
- C. Provide permanent grounds of dressed, pressure-preservative-treated, key-beveled lumber not less than 1-1/2 inches (38 mm) wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

3.3 PROTECTION

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

END OF SECTION 061053

SECTION 062013 - EXTERIOR FINISH CARPENTRY

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 wood trim.
 - 2. Fiber Cement siding, trim and panels

- B. Related Requirements:

- 1. Section 061053 "Miscellaneous Rough Carpentry" for furring, blocking, and other carpentry work not exposed to view.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials, dimensions, profiles, textures, and colors and include construction and application details.

- 1. Include data for wood-preservative treatment from chemical-treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained. Include chemical-treatment manufacturer's written instructions for finishing treated material.
 - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced before shipment to Project site to levels specified.

- B. Samples: For each exposed product and for each color and texture specified.

- C. Samples for Initial Selection: For each type of product involving selection of colors, profiles, or textures.

- D. Samples for Verification:

- 1. For each species and cut of lumber and panel products, with 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 hardboard siding, 50 sq. in. (300 sq. cm) for board types and 8 by 10 inches (200 by 250 mm) for panels.

1.4 INFORMATIONAL SUBMITTALS

- A. Compliance Certificates:
 - 1. For lumber that is not marked with grade stamp.
 - 2. For preservative-treated wood that is not marked with treatment-quality mark.
- B. Evaluation Reports: For the following, from ICC-ES:
 - 1. Wood-preservative-treated wood.
- C. Sample Warranties: For manufacturer's warranties.

1.5 QUALITY ASSURANCE

1.6 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.

1.7 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecast weather conditions permit work to be performed and at least one coat of specified finish can be applied without exposure to rain, snow, or dampness.
- 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.

1.8 WARRANTY

- A. Manufacturer's Warranty for Hardboard Siding Soffits and: Manufacturer agrees to repair or replace components that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, deformation or deterioration beyond normal weathering.
 - 2. Warranty Period for Factory-Applied Finish: Five years from date of Substantial Completion.
 - 3. Warranty Period for Siding Trim (Excluding Finish): 25 years from date of Substantial Completion.

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 inspection agency, indicating grade, species, moisture content at time of surfacing, and mill.
 - 2. For exposed lumber, mark grade stamp on end or back of each piece, or omit grade stamp and provide certificates of grade compliance issued by inspection agency.
- B. Softwood Plywood: DOC PS 1.
- C. Preservative Treatment by Pressure Process: AWP A U1; Use Category UC3a.
 - 1. Kiln dry lumber and plywood after treatment to a maximum moisture content of 19 and 18 percent, respectively.
 - 2. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
 - 3. For exposed items indicated to receive transparent finish, do not use chemical formulations that contain colorants or that bleed through or otherwise adversely affect finishes.
 - 4. Do not use material that is warped or does not comply with requirements for untreated material.
 - 5. Mark lumber with treatment-quality mark of an inspection agency approved by the ALSC's Board of Review.
 - a. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece or omit marking and provide certificates of treatment compliance issued by inspection agency.

2.2 EXTERIOR TRIM

- A. Lumber Trim for Painted Finish match existing trim:
 - 1. Species and Grade: Redwood; RIS Clear.
 - 2. Species and Grade: Western red cedar; NLGA, WCLIB, or WWP A Grade A.
 - 3. Species and Grade: Hem-fir; NLGA, WCLIB, or WWP A 1 Common.
 - 4. Species and Grade: Eastern white pine, eastern hemlock-balsam fir-tamarack, eastern spruce, or white woods; NeLMA, NLGA, WCLIB, or WWP A Finish or 1 Common (Colonial).
 - 5. Species and Grade: Northern white cedar; NeLMA or NLGA 1 Common.
 - 6. Maximum Moisture Content: 19 percent with at least 85 percent of shipment at 12 percent or less.
 - 7. Finger Jointing: Not allowed.
 - 8. Face Surface: Surfaced (smooth).

9. Factory Priming: Factory coated on both faces and all edges, with exterior primer compatible with topcoats specified.
- B. Moldings for Painted Finish: MMPA WM 4, P-grade wood moldings, made from kiln-dried stock to patterns included in MMPA's "WM/Series Softwood Moulding Patterns."
1. Species: Eastern white, Idaho white, lodgepole, ponderosa, radiata, or sugar pine.
 2. Finger Jointing: Not allowed.
 3. Factory Priming: Factory coated on both faces and all edges, with exterior primer compatible with topcoats specified.
 4. Brick-Mold Pattern: WWMPA WM 180, 1-1/4 by 2 inches (32 by 51 mm).
 5. Drip-Cap Pattern: WWMPA WM 197, 11/16 by 1-5/8 inches (17 by 41 mm).
 6. Bed-Mold Pattern: WWMPA WM 75, 9/16 by 1-5/8 inches (14 by 41 mm).
 7. Screen-Bead Pattern: WWMPA WM 144, 1/4 by 3/4 inch (6 by 19 mm).
- C. Primed fiber cement Trim: ANSI A135.6, primed with manufacturer's standard exterior primer. Recommended by manufacturer for exterior use.

2.3 MISCELLANEOUS MATERIALS

- A. Fasteners for Exterior Finish Carpentry: Provide nails or screws, in sufficient length to penetrate not less than 1-1/2 inches (38 mm) into wood substrate.
1. For face-fastening siding, provide ringed-shank siding nails or hot-dip galvanized-steel siding nails.
 2. For redwood, provide stainless steel fasteners.
 3. For prefinished items, provide matching prefinished aluminum fasteners where face fastening is required.
 4. For pressure-preservative-treated wood, provide hot-dip galvanized-steel fasteners.
 5. For applications not otherwise indicated, provide hot-dip galvanized-steel fasteners.
- B. Wood Glue: Waterproof resorcinol glue recommended by manufacturer for exterior carpentry use.
- C. Flashing: Comply with requirements in Section 076200 "Sheet Metal Flashing and Trim" for flashing materials installed in exterior finish carpentry.
1. Horizontal Joint Flashing for Panel Siding: Preformed, prefinished-aluminum, Z-shaped flashing.
- D. Continuous Soffit Vents: Fiber Cement soffit
1. Finish: paint.
- E. Sealants: Latex, complying with ASTM C 834 Type OP, Grade NF and applicable requirements in Section 079200 "Joint Sealants," and recommended by sealant and substrate manufacturers for intended application.

2.4 FABRICATION

- A. Back out or kerf backs of standing and running trim wider than 5 inches (125 mm), except members with ends exposed in finished work.
- 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. Prime lumber and moldings to be painted, including both faces and edges, unless factory primed.
 - 1. Cut to required lengths and prime ends.
 - 2. Comply with requirements in Section 099113 "Exterior Painting."

3.3 INSTALLATION, GENERAL

- A. Do not use materials that are unsound, warped, improperly treated or finished, inadequately seasoned, or too small to fabricate with proper jointing arrangements.
 - 1. Do not use manufactured units with defective surfaces, sizes, or patterns.
- B. Install exterior finish carpentry level, plumb, true, and aligned with adjacent materials.
 - 1. Use concealed shims where necessary for alignment.
 - 2. Scribe and cut exterior finish carpentry to fit adjoining work.
 - 3. Refinish and seal cuts as recommended by manufacturer.
 - 4. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining exterior 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 exterior finish carpentry with materials and systems in or adjacent to it.

6. Provide cutouts for mechanical and electrical items that penetrate exterior finish carpentry.

3.4 STANDING AND RUNNING TRIM INSTALLATION

- A. Install flat-grain lumber with bark side exposed to weather.
- B. Install fiber cement trim to comply with manufacturer's written instructions.
- C. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches (610 mm) long, except where necessary.
 1. Use scarf joints for end-to-end joints.
 2. Stagger end joints in adjacent and related members.
- D. Fit exterior joints to exclude water.
 1. Cope at returns and miter at corners to produce tight-fitting joints, with full-surface contact throughout length of joint.
 2. Plane backs of casings to provide uniform thickness across joints, where necessary for alignment.
- E. Where face fastening is unavoidable, countersink fasteners, fill surface flush, and sand unless otherwise indicated.
 1. Butt joints only over framing or blocking, nailing top and bottom on each side and staggering joints in subsequent courses.
 2. Install prefabricated outside corners as recommended by manufacturer of siding materials.

3.5 ADJUSTING

- A. Replace exterior finish carpentry that is damaged or does not comply with requirements.
 1. Exterior 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 exterior finish carpentry on exposed and semiexposed surfaces.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.

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 062013

SECTION 071326 - SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
 - 1. Modified bituminous sheet waterproofing.
 - 2. Bonded HDPE or polyethylene sheet waterproofing.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
 - 1. Review waterproofing requirements including surface preparation, substrate condition and pretreatment, minimum curing period, forecasted weather conditions, special details and sheet flashings, installation procedures, testing and inspection procedures, and protection and repairs.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include construction details, material descriptions, and tested physical and performance properties of waterproofing.
 - 2. Include manufacturer's written instructions for evaluating, preparing, and treating substrate.
- B. Shop Drawings: Show locations and extent of waterproofing and details of substrate joints and cracks, sheet flashings, penetrations, inside and outside corners, tie-ins with adjoining waterproofing, and other termination conditions.
 - 1. Include setting drawings showing layout, sizes, sections, profiles, and joint details of pedestal-supported concrete pavers.
- C. Samples: For each exposed product and for each color and texture specified, including the following products:
 - 1. 8-by-8-inch (200-by-200-mm) square of waterproofing and flashing sheet.
 - 2. 8-by-8-inch (200-by-200-mm) square of insulation.

3. 4-by-4-inch (100-by-100-mm) square of drainage panel.
4. Paver pedestal assembly.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Sample Warranties: For special warranties.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by waterproofing manufacturer.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to set quality standards for installation.
 1. Build for each typical waterproofing installation including accessories to demonstrate surface preparation, crack and joint treatment, corner treatment, and protection.
 - a. Size: 100 sq. ft. (9.3 sq. m) in area.
 - b. Description: Each type of wall installation.
 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 FIELD CONDITIONS

- A. Environmental Limitations: Apply waterproofing within the range of ambient and substrate temperatures recommended by waterproofing manufacturer. Do not apply waterproofing to a damp or wet substrate.
 1. Do not apply waterproofing in snow, rain, fog, or mist.
- B. Maintain adequate ventilation during preparation and application of waterproofing materials.

1.8 WARRANTY

- A. Manufacturer's Warranty: Manufacturer's standard materials-only warranty in which manufacturer agrees to furnish replacement waterproofing material for waterproofing that does not comply with requirements or that fails to remain watertight within specified warranty period.
 1. Warranty Period: Five years from date of Substantial Completion.

- B. Installer's Special Warranty: Specified form, signed by Installer, covering Work of this Section, for warranty period of two years.
 - 1. Warranty includes removing and reinstalling protection board, drainage panels, insulation, pedestals, and pavers on plaza decks.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations for Waterproofing System: Obtain waterproofing materials, protection course and molded-sheet drainage panels from single source from single manufacturer.

2.2 MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Modified Bituminous Sheet: Minimum 60-mil (1.5-mm) nominal thickness, self-adhering sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated on one side to a 4-mil- (0.10-mm-) thick, polyethylene-film reinforcement, and with release liner on adhesive side; formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include.
 - a. American Hydrotech, Inc.; VM75.
 - b. Carlisle Coatings & Waterproofing Inc.; CCW MiraDRI 860/861.
 - c. CETCO Building Materials Group, a subsidiary of AMCOL International Corp.; Envirosheet.
 - d. Grace, W. R., & Co. - Conn.; Bituthene 3000/Low Temperature or Bituthene 4000.
 - e. Henry Company; Blueskin WP 100/200.
 - f. Meadows, W. R., Inc.; SealTight Mel-Rol.
 - g. Nervastral, Inc.; BITU-MEM.
 - h. Polyguard Products, Inc.; Polyguard 650.
 - i. Protecto Wrap Company; PW 100/60.
 - j. Tamko Building Products, Inc.; TW-60.
 - k. York Manufacturing, Inc.; HydroGard.
 - 2. Physical Properties:
 - a. Tensile Strength, Membrane: 250 psi (1.7 MPa) minimum; ASTM D 412, Die C, modified.
 - b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
 - c. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D 1970.
 - d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3-mm) movement; ASTM C 836.
 - e. Puncture Resistance: 40 lbf (180 N) minimum; ASTM E 154.

- f. Water Absorption: 0.2 percent weight-gain maximum after 48-hour immersion at 70 deg F (21 deg C); ASTM D 570.
- g. Water Vapor Permeance: 0.05 perms (2.9 ng/Pa x s x sq. m) maximum; ASTM E 96/E 96M, Water Method.
- h. Hydrostatic-Head Resistance: 200 feet (60 m) minimum; ASTM D 5385.

2.3 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
 - 1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid waterborne primer recommended for substrate by sheet-waterproofing material manufacturer.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by sheet-waterproofing material manufacturer.
- D. Liquid Membrane: Elastomeric, two-component liquid, cold fluid applied, of trowel grade or low viscosity.
- E. Substrate Patching Membrane: Low-viscosity, two-component, modified asphalt coating.
- F. Metal Termination Bars: Aluminum bars, approximately 1 by 1/8 inch (25 by 3 mm) thick, predrilled at 9-inch (229-mm) centers.
- G. Protection Course: ASTM D 6506, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners and as follows:
 - 1. Thickness: 1/4 inch (6 mm), nominal.
 - 2. Thickness: 1/8 inch (3 mm), nominal, for vertical applications; 1/4 inch (6 mm), nominal, elsewhere.
 - 3. Adhesive: Rubber-based solvent type recommended by waterproofing manufacturer for protection course type.
- H. Protection Course: Fan folded, with a core of extruded-polystyrene board insulation faced on one side or both sides with plastic film, nominal thickness 1/4 inch (6 mm), with compressive strength of not less than 8 psi (55 kPa) per ASTM D 1621, and maximum water absorption by volume of 0.6 percent per ASTM C 272.
- I. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 1/2 inch (13 mm) thick.
- J. Protection Course: Molded-polystyrene board insulation, ASTM C 578, Type I, 0.90-lb/cu. ft. (15-kg/cu. m) minimum density, 1-inch (25-mm) minimum thickness.

2.4 INSULATION DRAINAGE PANELS

- A. Unfaced Wall-Insulation Drainage Panels: Extruded-polystyrene board insulation complying with ASTM C 578, Type VI, 40-psi (276-kPa) minimum compressive strength; unfaced; fabricated with shiplap or channel edges and with one side having grooved drainage channels.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include:
 - a. DiversiFoam Products; CertiFoam 40 Drainage Board.
 - b. Dow Chemical Company (The); Styrofoam Perimate.

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 waterproofing.
 - 1. Verify that concrete has cured and aged for minimum time period recommended in writing by waterproofing manufacturer.
 - 2. Verify that substrate is visibly dry and within the moisture limits recommended in writing by manufacturer. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
 - 3. Verify that compacted subgrade is dry, smooth, sound, and ready to receive waterproofing sheet.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 SURFACE PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing 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.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
- F. Bridge and cover expansion joints and discontinuous deck-to-wall and deck-to-deck joints with overlapping sheet strips of widths according to manufacturer's written instructions.
 - 1. Invert and loosely lay first sheet strip over center of joint. Firmly adhere second sheet strip to first and overlap to substrate.

- G. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
 - 1. Install membrane strips centered over vertical inside corners. Install 3/4-inch (19-mm) fillets of liquid membrane on horizontal inside corners and as follows:
 - a. At footing-to-wall intersections, extend liquid membrane in each direction from corner or install membrane strip centered over corner.
 - b. At plaza-deck-to-wall intersections, extend liquid membrane or sheet strips onto deck waterproofing and to finished height of sheet flashing.
- H. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

3.3 MODIFIED BITUMINOUS SHEET-WATERPROOFING APPLICATION

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and recommendations in ASTM D 6135.
- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams, and stagger end laps to ensure watertight installation.
 - 1. When ambient and substrate temperatures range between 25 and 40 deg F (minus 4 and plus 5 deg C), install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F (16 deg C).
- D. Horizontal Application: Apply sheets from low to high points of decks to ensure that laps shed water.
- E. Apply continuous sheets over already-installed sheet strips, bridging substrate cracks, construction, and contraction joints.
- F. Seal edges of sheet-waterproofing terminations with mastic.
- G. Install sheet-waterproofing and auxiliary materials to tie into adjacent waterproofing.
- H. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches (150 mm) beyond repaired areas in all directions.
- I. Immediately install protection course with butted joints over waterproofing membrane.

3.4 INSULATION DRAINAGE-PANEL INSTALLATION

- A. Install insulation drainage panels over waterproofed surfaces; cut and fit to within 3/4 inch (19 mm) of projections and penetrations.

- B. Ensure that drainage channels are aligned and free of obstructions.
- C. On vertical surfaces, set insulation drainage panels in adhesive or tape applied according to manufacturer's written instructions.
- D. On horizontal surfaces, loosely lay insulation drainage panels according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

3.5 FIELD QUALITY CONTROL

- A. Engage a site representative qualified by waterproofing membrane manufacturer to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish daily reports to Architect.
- B. Prepare test and inspection reports.

3.6 PROTECTION, REPAIR, AND CLEANING

- A. Do not permit foot or vehicular traffic on unprotected membrane.
- B. Protect waterproofing from damage and wear during remainder of construction period.
- C. Protect installed and insulation drainage panels from damage due to UV light, harmful weather exposures, physical abuse, and other causes. Provide temporary coverings where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.
- D. Correct deficiencies in or remove waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.
- E. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 071326

SECTION 072100 - THERMAL INSULATION

1PART - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following: Replace as required – an allowance will be provided.
 - 1. Fiberglass Batt Insulation.
- B. Related Sections include the following:
 - 1. NONE

1.3 DEFINITIONS

- A. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers; produced in boards and blanket with latter formed into batts (flat-cut lengths) or rolls.

1.4 PERFORMANCE REQUIREMENTS

- A. Plenum Rating: Provide glass-fiber insulation where indicated in ceiling plenums whose test performance is rated as follows for use in plenums as determined by testing identical products per "Erosion Test" and "Mold Growth and Humidity Test" described in UL 181, or on comparable tests from another standard acceptable to authorities having jurisdiction.
 - 1. Erosion Test Results: Insulation shows no visible evidence of cracking, flaking, peeling, or delamination of interior surface of duct assembly, after testing for 4 hours at 2500-fpm (13-m/s) air velocity.
 - 2. Mold Growth and Humidity Test Results: Insulation shows no evidence of mold growth, delamination, or other deterioration due to the effects of high humidity, after inoculation with *Chaetomium globosum* on all surfaces and storing for 60 days at 100 percent relative humidity in the dark.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: Full-size units for each type of exposed insulation indicated.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency for insulation products.
- D. Research/Evaluation Reports: For foam-plastic insulation.

1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of building insulation through one source from a single manufacturer.
- B. Fire-Test-Response Characteristics: Provide insulation and related materials with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify materials with appropriate markings of applicable testing and inspecting agency.
 - 1. Surface-Burning Characteristics: ASTM E 84.
 - 2. Fire-Resistance Ratings: ASTM E 119.
 - 3. Combustion Characteristics: ASTM E 136.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by 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 plastic insulation as follows:
 - 1. Do not expose to sunlight, except to extent necessary for period of installation and concealment.
 - 2. Protect 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.

2PART - PRODUCTS

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
 - 1. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, manufacturers specified.

2.2 GLASS-FIBER BLANKET INSULATION

- A. Available Manufacturers:
 - 1. CertainTeed Corporation.
 - 2. Guardian Fiberglass, Inc.
 - 3. Johns Manville.
 - 4. Knauf Fiber Glass.
 - 5. Owens Corning.
- B. Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type II (blankets with membrane facing), Class A (membrane-faced surface with a flame-spread index of 25 or less); Category 1 (membrane is a vapor barrier), faced with foil-scrim-kraft, foil-scrim, or foil-scrim-polyethylene vapor-retarder membrane on 1 face.
- C. Where glass-fiber blanket insulation is indicated by the following thicknesses, provide blankets in batt or roll form with thermal resistances indicated: Provide an average of R-38 insulation within the attic space.
 - 1. 3-1/2 inches (89 mm) thick with a thermal resistance of 13 deg F x h x sq. ft./Btu at 75 deg F (2.3 K x sq. m/W at 24 deg C).
 - 2. 3-5/8 inches (92 mm) thick with a thermal resistance of 13 deg F x h x sq. ft./Btu at 75 deg F (1.9 K x sq. m/W at 24 deg C).
 - 3. 5-1/2 inches (140 mm) thick with a thermal resistance of 19 deg F x h x sq. ft./Btu at 75 deg F (3.3 K x sq. m/W at 24 deg C).
 - 4. 6-1/2 inches (165 mm) thick with a thermal resistance of 21 deg F x h x sq. ft./Btu at 75 deg F (3.7 K x sq. m/W at 24 deg C).
 - 5. 9-1/2 inches (241 mm) thick with a thermal resistance of 30 deg F x h x sq. ft./Btu at 75 deg F (5.2 K x sq. m/W at 24 deg C).

2.3 AUXILIARY INSULATING MATERIALS

- A. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by insulation manufacturers for sealing joints and penetrations in vapor-retarder facings.
- B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates indicated without damaging insulation and substrates.

2.4 INSULATION FASTENERS

- A. Adhesively Attached, Spindle-Type Anchors: Plate welded to projecting spindle; capable of holding insulation of thickness indicated securely in position indicated with self-locking washer in place; and complying with the following requirements:
1. Available Products:
 - a. AGM Industries, Inc.; Series T TACTOO Insul-Hangers.
 - b. Eckel Industries of Canada; Stic-Klip Type N Fasteners.
 - c. Gemco; Spindle Type.
 2. Plate: Perforated galvanized carbon-steel sheet, 0.030 inch (0.762 mm) thick by 2 inches (50 mm) square.
 3. Spindle: Copper-coated, low carbon steel; fully annealed; 0.105 inch (2.67 mm) in diameter; length to suit depth of insulation indicated.
- B. 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. Available Products:
 - a. AGM Industries, Inc.; RC150.
 - b. AGM Industries, Inc.; SC150.
 - c. Gemco; Dome-Cap.
 - d. Gemco; R-150.
 - e. Gemco; S-150.
- C. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
1. Products:
 - a. AGM Industries, Inc.; TACTOO Adhesive.
 - b. Eckel Industries of Canada; Stic-Klip Type S Adhesive.
 - c. Gemco; Tuff Bond Hanger Adhesive.

3PART - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements of Sections in which substrates and related work are specified and for other conditions affecting performance.

1. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

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

3.3 INSTALLATION, GENERAL

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

3.4 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Set vapor-retarder-faced units with vapor retarder to warm-in-winter side of construction, unless otherwise indicated.
 1. Tape joints and ruptures in vapor retarder, and seal each continuous area of insulation to surrounding construction to ensure airtight installation.
- C. Install mineral-fiber insulation 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 cavity, 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.
 4. 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 with spindle type fasteners and support faced blankets by taping flanges of insulation to flanges of metal studs.
- D. Stuff glass-fiber loose-fill insulation into miscellaneous voids and cavity spaces where shown. Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

3.5 PROTECTION

- A. Protect installed insulation and vapor retarders 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 072119 - FOAMED-IN-PLACE INSULATION

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. Closed-cell spray polyurethane foam.
- B. Related Requirements:
 - 1. Section 072100 "Thermal Insulation" for foam-plastic board insulation.

1.3 ACTION SUBMITTALS

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

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For each product, for tests performed by a qualified testing agency.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

PART 2 - PRODUCTS

2.1 CLOSED-CELL SPRAY POLYURETHANE FOAM

- A. Closed-Cell Spray Polyurethane Foam: ASTM C1029, Type II, minimum density of 2.0 lb/cu ft (32kg/cu m) and minimum aged R-value at 1-inch (25.4-mm) thickness of 6.2 deg F x h x sq. ft./Btu at 75 deg F (43 K x sq. m/W at 24 deg C).

Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. BASF Corporation; Certain Teed Corporation; Dow Chemical Company
2. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
 - a. Flame-Spread Index: 25.
 - b. Smoke-Developed Index: 450 or less.
3. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.
 - a. Provide a 4" average thickness (R=25) of foam.

2.2 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by insulation manufacturer where required for adhesion of insulation to substrates.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Verify that substrates are clean, dry, and free of substances that are harmful to insulation.
- B. Priming: Prime substrates where recommended by insulation manufacturer. Apply primer to comply with insulation manufacturer's written instructions. Confine primers to areas to be insulated; do not allow spillage or migration onto adjoining surfaces.

3.2 INSTALLATION

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Spray insulation to envelop entire area to be insulated and fill voids.
- C. Apply in multiple passes to not exceed maximum thicknesses recommended by manufacturer. Do not spray into rising foam.
- D. Framed Construction: Install into cavities formed by framing members to achieve an average thickness of 4 inches.
- E. Miscellaneous Voids: Apply according to manufacturer's written instructions.

3.3 PROTECTION

- A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

END OF SECTION 072119

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 paper.
 - 2. Building wrap.
 - 3. Flexible flashing.
 - 4. 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.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

- A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
 - 1. Water-Vapor Permeance: Not less than **75 perms** per ASTM E 96/E 96M, Desiccant Method (Procedure A).
 - 2. Air Permeance: Not more than **0.004 cfm/sq. ft.** when tested according to ASTM E 2178.
 - 3. Allowable UV Exposure Time: Not less than three months.
 - 4. 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 **0.025 inch**
 - 1. 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 F 1667.

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**
 - 1. 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** on each side of the break in supporting members at expansion- or control-joint locations.
 - 2. Apply barrier to cover vertical flashing with a minimum **4-inch** overlap 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** 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

SECTION 072726 - FLUID-APPLIED MEMBRANE AIR BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes fluid-applied, vapor-permeable membrane air barriers.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
 - 1. Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of products.
- B. Shop Drawings: For air-barrier assemblies.
 - 1. Show locations and extent of air barrier. Include details for substrate joints and cracks, counterflashing strips, penetrations, inside and outside corners, terminations, and tie-ins with adjoining construction.
 - 2. 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 the 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.

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 150 sq. ft., 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 by Owner's testing agency 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 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, GENERAL

- A. Source Limitations: Obtain primary air-barrier materials and air-barrier accessories from single source from single manufacturer.
- B. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and complying with VOC content limits of authorities having jurisdiction.

2.2 PERFORMANCE REQUIREMENTS

- A. General: Air barrier shall be capable of performing as a continuous vapor-permeable air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. 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. when tested according to ASTM E 283, ASTM E 783 or ASTM E 2357.

2.3 VAPOR-PERMEABLE MEMBRANE AIR-BARRIER

- A. Fluid-Applied, Vapor-Permeable Membrane Air Barrier: Elastomeric, modified bituminous or synthetic polymer membrane.

- 1. Products: Subject to compliance with requirements, provide one of the following:

- a. Elastomeric, Modified Bituminous Membrane:

- 1) Henry Company; Air-Bloc 07.
 - 2) Hohmann & Barnard, Inc.; Textroflash Liquid VP.
 - 3) Meadows, W. R., Inc.; Air-Shield LMP.
 - 4) Tremco Incorporated, an RPM company; ExoAir 220R.

- b. Synthetic Polymer Membrane:

- 1) Carlisle Coatings & Waterproofing Inc.; Barritech VP.
 - 2) Grace, W. R., & Co. - Conn.; Perm-A-Barrier VP.
 - 3) Henry Company; Air-Bloc 31 or Air-Bloc 33.
 - 4) Rubber Polymer Corporation, Inc.; Rub-R-Wall Airtight VP.
 - 5) Tremco Incorporated, an RPM company; ExoAir 230.

- 2. Physical and Performance Properties:

- a. Air Permeance: Maximum 0.004 cfm/sq. ft. of surface area at 1.57-lbf/sq. ft. pressure difference; ASTM E 2178.
 - b. Vapor Permeance: Minimum 10 perms (580 ng/Pa x s x sq. m); ASTM E 96/E 96M.

- c. Ultimate Elongation: Minimum 200 percent; ASTM D 412, Die C.

2.4 ACCESSORY MATERIALS

- A. General: Accessory materials recommended by air-barrier manufacturer to produce a complete air-barrier assembly and compatible with primary air-barrier material.
- B. Primer: Liquid solvent-borne primer recommended for substrate by air-barrier material manufacturer.
- C. Counterflashing Strip: Modified bituminous, 40-mil- thick, self-adhering sheet consisting of 32 mils of rubberized asphalt laminated to an 8-mil- thick, cross-laminated polyethylene film with release liner backing.
- D. Joint Reinforcing Strip: Air-barrier manufacturer's glass-fiber-mesh tape.
- E. Substrate-Patching Membrane: Manufacturer's standard trowel-grade substrate filler.
- F. Adhesive and Tape: Air-barrier manufacturer's standard adhesive and pressure-sensitive adhesive tape.
- G. Sprayed Polyurethane Foam Sealant: One- or two-component, foamed-in-place, polyurethane foam sealant, 1.5- to 2.0-lb/cu. ft density; flame-spread index of 25 or less according to ASTM E 162; with primer and noncorrosive substrate cleaner recommended by foam sealant manufacturer.
- H. Modified Bituminous Transition Strip: Vapor retarding, 40 mils thick, smooth surfaced, self-adhering; consisting of 36 mils of rubberized asphalt laminated to a 4-mil- thick polyethylene film with release liner backing.
- I. Adhesive-Coated Transition Strip: Vapor-permeable, 17-mil-thick, self-adhering strip consisting of an adhesive coating over a permeable laminate with a permeance value of 37 perms.
- J. Joint Sealant: ASTM C 920, single-component, neutral-curing silicone; Class 100/50 (low modulus), Grade NS, Use NT related to exposure, and, as applicable to joint substrates indicated, Use O. Comply with Section 079200 "Joint Sealants."

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
 - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
 - 2. Verify that concrete has cured and aged for minimum time period recommended by air-barrier manufacturer.

3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
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, and seal substrate according to manufacturer's written instructions. 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 membrane.
- 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.

3.3 JOINT TREATMENT

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

3.4 TRANSITION STRIP INSTALLATION

- A. General: Install strips, transition strips, and accessory materials according to air-barrier manufacturer's written instructions to form a seal with adjacent construction and maintain a continuous air barrier.

- B. Apply primer to substrates at required rate and allow it to dry. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.
 - 1. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- C. 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.
- D. At end of each working day, seal top edge of strips and transition strips to substrate with termination mastic.
- E. Apply joint sealants forming part of air-barrier assembly within manufacturer's recommended application temperature ranges. Consult manufacturer when sealant cannot be applied within these temperature ranges.
- F. Wall Openings: Prime concealed, perimeter frame surfaces of windows, curtain walls, storefronts, and doors. Apply adhesive-coated transition strip so that a minimum of 3 inches of coverage is achieved over each substrate. Maintain 3 inches of full contact over firm bearing to perimeter frames with not less than 1 inch of full contact.
 - 1. Adhesive-Coated Transition Strip: Roll firmly to enhance adhesion.
- G. Fill gaps in perimeter frame surfaces of windows, curtain walls, storefronts, and doors, and miscellaneous penetrations of air-barrier material with foam sealant.
- H. Seal strips and transition strips around masonry reinforcing or ties and penetrations with termination mastic.
- I. Seal top of through-wall flashings to air barrier with an additional 6-inch- wide, counterflashing strip.
- J. Seal exposed edges of strips at seams, cuts, penetrations, and terminations not concealed by metal counterflashings or ending in reglets with termination mastic.
- K. Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fishmouths and blisters. Patch with transition strips extending 6 inches beyond repaired areas in strip direction.

3.5 FLUID AIR-BARRIER MEMBRANE INSTALLATION

- A. General: Apply fluid 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. Apply fluid air-barrier material within manufacturer's recommended application temperature ranges.
 - 1. Apply primer to substrates at required rate and allow it to dry.
 - 2. Limit priming to areas that will be covered by fluid air-barrier material on same day. Reprime areas exposed for more than 24 hours.

3. Prime glass-fiber-surfaced gypsum sheathing with number of prime coats needed to achieve required bond, with adequate drying time between coats.
- B. Membrane Air Barriers: Apply a continuous unbroken air-barrier membrane to substrates according to the following thickness. Apply air-barrier membrane in full contact around protrusions such as masonry ties.
1. Vapor-Permeable Membrane Air Barrier: Total dry film thickness as recommended in writing by manufacturer to meet performance requirements, but not less than 40-mil (1.0-mm) dry film thickness, applied in one or more equal coats.
- C. Apply strip and transition strip over cured air-barrier material overlapping 3 inches onto each surface according to air-barrier manufacturer's written instructions.
- D. Do not cover air barrier until it has been tested and inspected by Owner's testing agency.
- E. Correct deficiencies in or remove air barrier that does not comply with requirements; repair substrates and reapply air-barrier components.

3.6 FIELD QUALITY CONTROL

- A. Inspections: Air-barrier materials, accessories, and installation are subject to inspection for compliance with requirements. Inspections may include the following:
1. Continuity of air-barrier system has been achieved throughout the building envelope with no gaps or holes.
 2. Continuous structural support of air-barrier system has been provided.
 3. Masonry and concrete surfaces are smooth, clean, and free of cavities, protrusions, and mortar droppings.
 4. Site conditions for application temperature and dryness of substrates have been maintained.
 5. Maximum exposure time of materials to UV deterioration has not been exceeded.
 6. Surfaces have been primed, if applicable.
 7. 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.
 8. Termination mastic has been applied on cut edges.
 9. Strips and transition strips have been firmly adhered to substrate.
 10. Compatible materials have been used.
 11. Transitions at changes in direction and structural support at gaps have been provided.
 12. Connections between assemblies (air-barrier and sealants) have complied with requirements for cleanliness, surface preparation and priming, structural support, integrity, and continuity of seal.
 13. All penetrations have been sealed.
- B. 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.
- C. Repair damage to air barriers caused by testing; follow manufacturer's written instructions.

3.7 CLEANING AND PROTECTION

- A. Protect air-barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
 - 1. Protect air barrier from exposure to UV light and harmful weather exposure as required by manufacturer. If exposed to these conditions for more than 30 days, remove and replace air barrier or install additional, full-thickness, air-barrier application after repairing and preparing the overexposed membrane according to air-barrier manufacturer's written instructions.
 - 2. Protect air barrier from contact with incompatible materials and sealants not approved by air-barrier manufacturer.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION 07 27 26

SECTION 07411.16 - 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 standing-seam metal roof panels.
- B. Related Sections:
 - 1. Section 072100 "Thermal Insulation" for insulation under roof panels, with exposed galvalume finish.

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 purlins and rafters 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. Engage a qualified professional engineer, as defined by Section 014000 "Quality Requirements," to prepare Shop Drawings. The professional engineer shall be registered in Florida and shall sign, seal and date any documents for which he or she is responsible.
 - 2. 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.
 - 3. 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.
 - 1. Include similar Samples of trim and 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. 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. 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 roof area and eave, including fascia, as shown on Drawings; approximately 12 feet (3.5 m) square by full thickness, including 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. 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.

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 Galvalume 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: Twenty years from date of Substantial Completion.
- B. Special Weathertightness Warranty: Manufacturer's no dollar limit 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 and steep-slope roof products.
- B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the following loads, based on testing according to ASTM E 1592:
1. Wind Loads: As indicated on Drawings.
 2. Other Design Loads: As indicated on Drawings.
 3. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- C. 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 E 1680 or ASTM E 283 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 1646 and ASTM E 331 at the following test-pressure difference:
1. Test-Pressure Difference: 15 lbf/sq. ft. (718.2 Pa).
- E. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.
- 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- 120.
 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. General: 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. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E 1514.
- B. Vertical-Rib, Seamed-Joint, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges, panel striations, 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. Basis-of-Design Product: Subject to Compliance with requirements, provide Berridge Manufacturing Company; Double-Lock Zee-Lock (180 deg Seam) or comparable product by one of the following:
 - a. AEP Span; A BlueScope Steel Company.
 - b. CENTRIA Architectural Systems.
 - c. MBCI; a division of NCI Group, Inc.
 - d. McElroy Metal, Inc.
 - e. Merchant & Evans Inc.
 - f. Peterson Aluminum
 2. Metallic-Coated Steel Sheet: Zinc-coated (galvanized) steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation, or aluminum-zinc alloy-coated steel sheet complying with ASTM A 792/A 792M, Class AZ55 coating designation; structural quality. Prepainted by the coil-coating process to comply with ASTM A 755/A 755M.
 - a. Nominal Thickness: 24 Gauge.
 3. Clips: Continuous Zee Rib to accommodate thermal movement.
 - a. Material: 0.064-inch- (1.63-mm-) nominal thickness, zinc-coated (galvanized) or aluminum-zinc alloy-coated steel sheet.
 4. Joint Type: Double 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 D 1970.
 2. Low-Temperature Flexibility: Passes after testing at minus 20 deg F (29 deg C); ASTM D 1970.
 3. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Mid-States Asphalt Quick Stick HT Pro
 - b. Polyglass Polystick MTS
 - c. Soprema Lastobond Shield HT
 - d. Tamko TW Underlayment or TW Metal & Tile Underlayment

2.4 MISCELLANEOUS MATERIALS

- A. Miscellaneous Metal Subframing and Furring: ASTM C 645; cold-formed, metallic-coated steel sheet, ASTM A 653/A 653M, G90 (Z275 hot-dip galvanized) coating designation or ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation unless otherwise indicated. Provide manufacturer's standard sections as required for support and alignment of metal panel system.
- 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.
- 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. Gutters: Formed from same material as roof panels, complete with end pieces, outlet tubes, and other special pieces as required. Fabricate in minimum 96-inch- (2400-mm-) long sections, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Furnish gutter supports spaced a maximum of 36 inches (914 mm) o.c., fabricated from same metal as

gutters. Provide wire ball strainers of compatible metal at outlets. Finish gutters to match roof fascia and rake trim.

- E. Downspouts: Formed from same material as roof panels. Fabricate in 10-foot- (3-m-) long sections, complete with formed elbows and offsets, of size and metal thickness according to SMACNA's "Architectural Sheet Metal Manual." Finish downspouts to match gutters.
- F. 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.
- G. Panel Fasteners: Self-tapping screws designed to withstand design loads of zinc coated steel.
- H. Panel Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
 - 1. Joint Sealant: ASTM C 920; elastomeric 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.

2.5 FABRICATION

- A. General: 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. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- C. 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 Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 3. Sealed Joints: Form nonexpansion, but movable, joints in metal to accommodate sealant and to comply with SMACNA standards.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended 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.

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 C 754 and metal panel manufacturer's written recommendations.

3.3 UNDERLAYMENT INSTALLATION

- 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). Extend underlayment into gutter trough. 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 METAL PANEL INSTALLATION

- A. General: 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. Locate and space fastenings in uniform vertical and horizontal alignment.
 - 4. Install flashing and trim as metal panel work proceeds.
 - 5. 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.
 - 6. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Fasteners:
 - 1. Steel Panels: Use stainless-steel fasteners for surfaces exposed to the exterior; use 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.
- 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. Gutters: Join sections with riveted and soldered or lapped and sealed joints. Attach gutters to eave with gutter hangers spaced not more than 36 inches (914 mm) o.c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- I. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1524 mm) o.c. in between.
 - 1. Provide elbows at base of downspouts to direct water away from building.
 - 2. Connect downspouts to underground drainage system indicated.
- J. Roof Curbs: Install flashing around bases where they meet metal roof panels.

- K. 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

SECTION 076200 - SHEET METAL FLASHING AND TRIM

1PART - 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. Is section is add if needed by the contractor.

1.2 SUMMARY

A. Section Includes:

1. Manufactured Products:

- a. Manufactured through-wall flashing and counterflashing.
- b. Manufactured reglets and counterflashing.

2. Formed Products:

- a. Formed low-slope roof sheet metal fabrications.

B. Related Sections:

- 1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.

1.3 PERFORMANCE REQUIREMENTS

- A. General: Sheet metal flashing and trim assemblies as indicated 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. Fabricate and install copings capable of resisting the following forces according to recommendations in FMG Loss Prevention Data Sheet 1-49:

- 1. Wind Zone 1: For velocity pressures of 10 to 20 lbf/sq. ft. (0.48 to 0.96 kPa): 40-lbf/sq. ft. (1.92-kPa) perimeter uplift force, 60-lbf/sq. ft. (2.87-kPa) corner uplift force, and 20-lbf/sq. ft. (0.96-kPa) outward force.
- 2. Wind Zone 1: For velocity pressures of 21 to 30 lbf/sq. ft. (1.00 to 1.44 kPa): 60-lbf/sq. ft. (2.87-kPa) perimeter uplift force, 90-lbf/sq. ft. (4.31-kPa) corner uplift force, and 30-lbf/sq. ft. (1.44-kPa) outward force.

3. Wind Zone 2: For velocity pressures of 31 to 45 lbf/sq. ft. (1.48 to 2.15 kPa): 90-lbf/sq. ft. (4.31-kPa) perimeter uplift force, 120-lbf/sq. ft. (5.74-kPa) corner uplift force, and 45-lbf/sq. ft. (2.15-kPa) outward force.
 4. Wind Zone 3: For velocity pressures of 46 to 104 lbf/sq. ft. (2.20 to 4.98 kPa): 208-lbf/sq. ft. (9.96-kPa) perimeter uplift force, 312-lbf/sq. ft. (14.94-kPa) corner uplift force, and 104-lbf/sq. ft. (4.98-kPa) outward force.
- C. Thermal Movements: Provide sheet metal flashing and trim that allows 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.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work. Include the following:
1. Identification of material, thickness, weight, and finish for each item and location in Project.
 2. Details for forming sheet metal flashing and trim, including profiles, shapes, seams, and dimensions.
 3. Details for joining, supporting, and securing sheet metal flashing and trim, including layout of fasteners, cleats, clips, and other attachments. Include pattern of seams.
 4. Details of termination points and assemblies, including fixed points.
 5. Details of expansion joints and expansion-joint covers, including showing direction of expansion and contraction.
 6. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counterflashings as applicable.
 7. Details of special conditions.
 8. Details of connections to adjoining work.
 9. Detail formed flashing and trim 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 sheet metal flashing, trim, and accessory indicated with factory-applied color finishes involving color selection.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below:
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. 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 qualified fabricator.

B. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing, trim, and accessories to include in maintenance manuals.

1.7 QUALITY ASSURANCE

A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.

B. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.

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 mockup of typical roof eave, including coping and flashing, 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 Architect specifically approves such deviations in writing.
3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

D. Preinstallation Conference: Conduct conference at Project site.

1. Meet with Owner, Architect, Owner's insurer if applicable, Installer, and installers whose work interfaces with or affects sheet metal flashing and trim including installers of roofing materials, roof accessories, unit skylights, and roof-mounted equipment.
2. Review methods and procedures related to sheet metal flashing and trim.

3. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
4. Review special roof details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect sheet metal flashing.
5. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

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. Store sheet metal flashing and trim materials away from uncured concrete and masonry.
- B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to the extent necessary for the period of sheet metal flashing and trim installation.

1.9 WARRANTY

- A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
2. Finish Warranty Period: 20 years from date of Substantial Completion.

2PART - PRODUCTS

2.1 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
 - B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
1. Exposed Coil-Coated Finishes:
 - a. Three-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in both color coat and clear

topcoat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Color: To be selected by Architect from Manufacturer's full range of colors.
3. Concealed Finish: Pretreat with manufacturer's standard dark-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).

2.2 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. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).
 3. Products: Subject to compliance with requirements, provide one of the following :
 - a. Carlisle Coatings & Waterproofing Inc.; CCW WIP 300HT.
 - b. Grace Construction Products, a unit of W. R. Grace & Co.; Ultra.
 - c. Henry Company; Blueskin PE200 HT.
 - d. Metal-Fab Manufacturing, LLC; MetShield.
 - e. Owens Corning; WeatherLock Metal High Temperature Underlayment.
- B. Slip Sheet: Building paper, 3-lb/100 sq. ft. (0.16-kb/sq. m)minimum, rosin sized.

2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal 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.
 - 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.
- C. 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.
- D. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, 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 complying with ASTM D 1187.
- H. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.

2.4 MANUFACTURED SHEET METAL FLASHING AND TRIM

- A. Reglets: Units of type, material, and profile indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with interlocking counterflashing on exterior face, of same metal as reglet.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - a. Cheney Flashing Company.
 - b. Fry Reglet Corporation.
 - c. Heckmann Building Products Inc.
 - d. Hickman, W. P. Company.
 - e. Hohmann & Barnard, Inc.; STF Sawtooth Flashing.
 - f. Keystone Flashing Company, Inc.
 - g. National Sheet Metal Systems, Inc.
 - h. Sandell Manufacturing Company, Inc.
2. Material: Aluminum, 0.024 inch (0.61 mm) thick for replacement of existing reglets.
3. 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 lower edge.
- 4. Finish: manufacturer's standard color coating.

2.5 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
 - 1. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
 - 2. Obtain field measurements for accurate fit before shop fabrication.
 - 3. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
 - 4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (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.
- C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."
- D. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- E. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
- F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- G. Fabricate cleats and attachment devices of sizes as recommended by SMACNA's "Architectural Sheet Metal Manual" for application, but not less than thickness of metal being secured.
- H. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

- I. Seams: 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.
- J. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.
- K. Do not use graphite pencils to mark metal surfaces.

2.6 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-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, seal, and solder or weld watertight.

- 1. Coping Profile: SMACNA figure designation 3-4A.
- 2. Joint Style: Butt, with 12-inch- (300-mm-) wide, concealed backup plate.
- 3. Fabricate from the following materials:
 - a. Aluminum: 0.050 inch (1.27 mm) thick.
 - b. Color: Match existing at building.

B. Base Flashing: Fabricate from the following materials:

- 1. Aluminum: 0.040 inch (1.02 mm) thick.

C. Counterflashing: Fabricate from the following materials:

- 1. Aluminum: 0.032 inch (0.81 mm) thick.

D. Flashing Receivers: Fabricate from the following materials:

- 1. Aluminum: 0.032 inch (0.81 mm) thick.

2.7 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, at shelf angles, and where indicated. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings. Form with 2-inch- (50-mm-) high, end dams where flashing is discontinuous. Fabricate from the following materials:

- 1. Copper: 16 oz./sq. ft. (0.55 mm thick).

2.8 MISCELLANEOUS SHEET METAL FABRICATIONS

3PART - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, to verify actual locations, dimensions and other conditions affecting performance of the Work.
 - 1. Verify compliance with requirements for installation tolerances of substrates.
 - 2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
- B. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 UNDERLAYMENT INSTALLATION

- A. General: Install underlayment as indicated on Drawings.
- B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Apply primer if required by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

3.3 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
 - 1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
 - 2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
 - 3. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
 - 4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.

5. Install sealant tape where indicated.
 6. Torch cutting of sheet metal flashing and trim is not permitted.
 7. Do not use graphite pencils to mark metal surfaces.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
1. Coat back side of uncoated aluminum and stainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
 2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
- D. Fastener Sizes: Use fasteners of sizes that will penetrate wood 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 joints as shown and as required for watertight construction.
1. Where sealant-filled joints are used, embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. When ambient temperature at time of installation is moderate, between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
 2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

3.4 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.

- C. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at 24-inch (600-mm) centers.
- D. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated.
1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch (600-mm) centers.
- E. Copings: Anchor to resist uplift and outward forces according to recommendations in FMG Loss Prevention Data Sheet 1-49 for specified wind zone and as indicated.
1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at 24-inch (600-mm) centers.
- G. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with sealant. Secure in a waterproof manner by means of snap-in installation and sealant or lead wedges and sealant.
- H. 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.

3.5 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.
- B. Through-Wall Flashing: Installation of through-wall flashing is specified in Section 042000 "Unit Masonry."
- C. Reglets: Installation of reglets per manufacture instructions.
- D. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

3.6 ERECTION 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 as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

- B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.7 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Clean and neutralize flux materials. Clean off excess solder.
- C. Clean off excess sealants.
- D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions. On completion of installation, remove unused materials and clean finished surfaces. Maintain in a clean condition during construction.
- E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

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. Roof-edge drainage systems.

- B. Related Requirements:

- 1. Section 061053 "Miscellaneous Rough Carpentry" for wood nailers, curbs, and blocking.
 - 2. Section 079200 "Joint Sealants" for field-applied sealants between roof specialties and adjacent materials.

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

- 1. Meet with Owner, Architect, Owner's insurer if applicable, roofing-system testing and inspecting agency representative, roofing Installer, roofing-system manufacturer's representative, Installer, structural-support Installer, and installers whose work interfaces with or affects roof specialties, including installers of roofing materials and accessories.
 - 2. Examine substrate conditions for compliance with requirements, including flatness and attachment to structural members.
 - 3. Review special roof details, roof drainage, and condition of other construction that will affect roof specialties.

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.
- D. Samples for Initial Selection: For each type of roof specialty indicated with factory-applied color finishes.
- E. Samples for Verification:
1. Include Samples of each type of roof specialty to verify finish and color selection, in manufacturer's standard sizes.
 2. Include roof-edge drainage systems made from 12-inch (300-mm) lengths of full-size components in specified material, and including fasteners, cover joints, accessories, and attachments.

1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For manufacturer.
- B. Product Certificates: For each type of roof specialty.
- C. 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 for 130 mph wind speed.
- B. Source Limitations: Obtain roof specialties approved by manufacturer providing roofing-system warranty specified in Section Insert Section number and title.
- 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 drainage system, including fascia, gutter and downspout, approximately 10 feet (3.0 m) long, including supporting construction, seams, attachments, 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.
- 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 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 10 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 roof-edge drainage specialties that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-120. Identify materials with FM Approvals' markings.
- C. SPRI Wind Design Standard: Manufacture and install copings roof-edge drainage specialties tested according to SPRI ES-1 and capable of resisting the following design pressures:

1. Design Wind Speed: 130 mph .
- 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 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. Architectural Products Company.
 2. ATAS International, Inc.
 3. Berger Building Products, Inc.
 4. Castle Metal Products.
 5. Cheney Flashing Company.
 6. Exceptional Metals.
 7. Perimeter Systems; a division of SAF.
 8. SAF (Southern Aluminum Finishing Company, Inc.).
- B. Gutters: Manufactured in uniform section lengths not exceeding 12 feet (3.6 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: 0.063 inch (1.60 mm) thick.
 2. Gutter Profile: Style A according to SMACNA's "Architectural Sheet Metal Manual."
 3. Corners: Factory mitered and mechanically clinched and sealed watertight.
 4. Gutter Supports: Gutter brackets or Straps with finish matching the gutters.
 5. Gutter Accessories: Continuous screened leaf guard with sheet metal frame.
- C. Downspouts: Plain rectangular complete with mitered elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.
1. Extruded Aluminum: 0.125 inch (3.18 mm) thick.
- D. Aluminum Finish: Two-coat fluoropolymer.
1. Color: White
- E. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper to suit forming operations and performance required.

- F. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), alloy and temper recommended by manufacturer for type of use and finish indicated, finished as follows:

2.3 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 Aluminum: Aluminum or Series 300 stainless steel.
- B. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.
- C. Butyl Sealant: ASTM C 1311, 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 D 1187/D 1187M.
- E. Asphalt Roofing Cement: ASTM D 4586, asbestos free, of consistency required for application.
- F. Pre-cast Concrete Splash Blocks: 12" x 24" x 3" Precast concrete splash blocks.

2.4 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are 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 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 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.
- E. Aluminum Extrusion 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 2604. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

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, GENERAL

- A. General: 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 with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
 - 2. Provide uniform, neat seams with minimum exposure of 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.
- C. Fastener Sizes: Use fasteners of sizes that penetrate substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- D. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.
- E. 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).

3.3 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION

- A. General: 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.
 - 2. Install continuous leaf guards on gutters with noncorrosive fasteners, removable for cleaning gutters.
- 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.
- D. Precast Concrete Splash Blocks: Install where downspouts discharge on Grade.

3.4 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 079200 - JOINT SEALANTS

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. Silicone joint sealants.
 - 2. Nonstaining silicone joint sealants.
 - 3. Mildew-resistant joint sealants.
 - 4. Latex joint sealants.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranties: For special warranties.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.6 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.

1.7 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: Twenty 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 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.

2.2 NONSTAINING SILICONE JOINT SEALANTS

- A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.
- 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 C 920, Type S, Grade NS, Class 50, Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following :
 - a. Dow Corning Corporation; 795.
 - b. Pecora Corporation; 895NST.
 - c. Tremco Incorporated; Spectrem 2.

2.3 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 C 920, Type S, Grade NS, Class 25, Use NT.
 - 1. Products: Subject to compliance with requirements, provide one of the following :
 - a. Dow Corning Corporation; 786-M White.
 - b. GE Construction Sealants; SCS1700 Sanitary.
 - c. Tremco Incorporated; Tremsil 200.

2.4 LATEX JOINT SEALANTS

- A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Construction Chemicals, LLC, Building Systems; Sonolac.
 - b. Pecora Corporation; AC-20.
 - c. Sherwin-Williams Company (The); 850A.
 - d. Tremco Incorporated; Tremflex 834.

2.5 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.
- B. Cylindrical Sealant Backings: ASTM C 1330, 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.

2.6 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.
 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.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
 2. Do not stretch, twist, puncture, or tear sealant backings.
 3. Remove absorbent sealant backings that have become wet before sealant application, and replace them with dry materials.
- 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 per Figure 8A in ASTM C 1193 unless otherwise indicated.
 4. Provide recessed joint configuration of recess depth and at veneer stone applications according to Figure 8C in ASTM C 1193.
 - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

3.4 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.

3.5 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.

3.6 JOINT-SEALANT SCHEDULE

A. Joint-Sealant Application: Exterior joints in vertical surfaces and horizontal nontraffic surfaces (JS-1).

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. Perimeter joints between materials listed above and frames of doors windows and louvers.
- f. 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.

B. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement (JS-2).

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 and fiber cement siding.
- c. 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.

C. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces (JS-3).

1. Joint Locations:

- a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
- b. Tile control and expansion joints where indicated.
- c. 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 .

END OF SECTION 079200

SECTION 099113 - EXTERIOR PAINTING

1 PART - 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 surface preparation and the application of paint systems on exterior substrates.
 - 1. Concrete.
 - 2. Clay masonry.
 - 3. Concrete masonry units (CMU).
 - 4. Steel.
 - 5. Galvanized metal.
 - 6. Exterior cement fiber siding and trim
- B. Related Requirements:
 - 1. Section 099123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- E. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.

- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
 - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
 - 2. Step coats on Samples to show each coat required for system.
 - 3. Label each coat of each Sample.
 - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:
 - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
 - 2. Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
 - 3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
 - 1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 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 specified in Part 3.
 - 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.

1.7 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.

1.8 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 in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

2 PART - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Behr Process Corporation.
 - 2. Benjamin Moore & Co.
 - 3. Benjamin Moore & Co. (Canada).
 - 4. Bennette Paint Manufacturing Company, Inc.
 - 5. Betonel Ltd.
 - 6. BLP Mobile Paint Manufacturing.
 - 7. California Paints.
 - 8. Cloverdale Paint.
 - 9. Color Wheel Paints & Coatings.
 - 10. Columbia Paint & Coatings.
 - 11. Conco Paints.
 - 12. Coronado Paint.
 - 13. Davis Paint Company.
 - 14. Del Technical Coatings.
 - 15. Diamond Vogel Paints.
 - 16. Dunn-Edwards Corporation.
 - 17. Durant Performance Coatings.
 - 18. Duron, Inc.
 - 19. Envirocoatings Canada Inc.
 - 20. Euclid Chemical Company.
 - 21. Farrell-Calhoun.
 - 22. Frazee Paint.
 - 23. General Paint.
 - 24. Hallman Lindsay Paints.
 - 25. Hirshfield's, Inc.
 - 26. ICI Paints.
 - 27. ICI Paints (Canada).

28. Insl-x.
29. Kelly-Moore Paints.
30. Kwal Paint.
31. Life Paint Corp.
32. M.A.B. Paints.
33. Microblend Technologies Inc.
34. Miller Paint.
35. Mills Paint.
36. PARA Paints.
37. Parex LaHabra Inc.
38. Parker Paint Mfg. Co. Inc.
39. PPG Architectural Finishes, Inc.
40. Pratt & Lambert.
41. Rodda Paint Co.
42. Scott Paint.
43. Sherwin-Williams Company (The).
44. Sico, Inc.
45. Vista Paint.
46. Zinsser.

- B. Products: Subject to compliance with requirements, provide one of the products listed in other Part 2 articles for the paint category indicated.

2.2 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility:
1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- D. Colors: As selected by Architect from manufacturer's full range.
1. 30 percent of surface area will be painted with deep tones.

2.3 BLOCK FILLERS

- A. Block Filler, Latex, Interior/Exterior: MPI #4.
1. Sherwin Williams; Loxon Concrete and Masonry Primers.

2.4 PRIMERS/SEALERS

- A. Primer, Alkali Resistant, Water Based: MPI #3.
 - 1. Sherwin Williams; Pro Industrial Pro Cryl.
- B. Primer, Bonding, Water Based: MPI #17.
 - 1. Sherwin Williams; Multipurpose Latex Primer.

2.5 METAL PRIMERS

- A. Primer, Alkyd, Anti-Corrosive for Metal: MPI #79.
 - 1. Sherwin Williams; Multipurpose Oil Based Primer.
- B. Primer, Alkyd, Quick Dry, for Metal: MPI #76.
 - 1. Sherwin Williams; Fast Drying Primer.
- C. Primer, Galvanized: As recommended in writing by topcoat manufacturer.

2.6 WATER-BASED PAINTS

- A. Latex, Exterior Flat (Gloss Level 1): MPI #10.
 - 1. Sherwin Williams; Duration Exterior Acrylic.
- B. Latex, Exterior Semi-Gloss (Gloss Level 5): MPI #11.
 - 1. Sherwin Williams; Duration Exterior Acrylic.

2.7 FLOOR COATINGS

- A. Sealer, Water Based, for Concrete Floors: MPI #99.

2.8 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:
 - 1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
 - 2. Testing agency will perform tests for compliance with product requirements.
 - 3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with

rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART - EXECUTION

2.9 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 - 1. Concrete: 12 percent.
 - 2. Masonry (Clay and CMU): 12 percent.
 - 3. Wood: 15 percent.
 - 4. Portland Cement Plaster: 12 percent.
 - 5. Gypsum Board: 12 percent.
- C. Portland Cement Plaster Substrates: Verify that plaster is fully cured.
- D. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- E. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- F. Proceed with coating application only after unsatisfactory conditions have been corrected.
 - 1. Application of coating indicates acceptance of surfaces and conditions.

2.10 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
 - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
 - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
 - 1. SSPC-SP 2, "Hand Tool Cleaning."
 - 2. SSPC-SP 3, "Power Tool Cleaning."
 - 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
 - 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
 - 1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
 - 2. Sand surfaces that will be exposed to view, and dust off.
 - 3. Prime edges, ends, faces, undersides, and backsides of wood.
 - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

2.11 APPLICATION

- A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
 - 1. Use applicators and techniques suited for paint and substrate indicated.
 - 2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.
 - 3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
 - 4. Paint entire exposed surface of window frames and sashes.
 - 5. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

6. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. 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 piping.
 - c. Uninsulated plastic piping.
 - d. Pipe hangers and supports.
 - e. Metal conduit.
 - f. Plastic conduit.
 - g. Tanks that do not have factory-applied final finishes.

2.12 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.

2.13 CLEANING AND PROTECTION

- A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
- B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.
- C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

- D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

2.14 EXTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System:

- a. Prime Coat: Latex, exterior, matching topcoat.
- b. Prime Coat: Primer, alkali resistant, water based, MPI #3.
- c. Intermediate Coat: Latex, exterior, matching topcoat.
- d. Topcoat: Latex, exterior flat (Gloss Level 1), MPI #10.
- e. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4), MPI #15.
- f. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11.
- g. Topcoat: Latex, exterior gloss (Gloss Level 6), MPI #119.

B. Steel Substrates:

1. Water-Based Coating System:

- a. Prime Coat: Primer, alkyd, anti-corrosive for metal, MPI #79.
- b. Topcoat: Light industrial coating, exterior, water based, semi-gloss (Gloss Level 5), MPI #163.

C. Galvanized-Metal Substrates:

1. Latex System:

- a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.
- b. Intermediate Coat: Latex, exterior, matching topcoat.
- c. Topcoat: Latex, exterior flat (Gloss Level 1), MPI #10.
- d. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11.

D. Wood and Fiber Cement siding and trim

1. Latex System

- a. Prime Coat: Latex, exterior, matching topcoat.
- b. Prime Coat: Primer, Latex, water based, MPI #6.
- c. Intermediate Coat: Latex, exterior, matching topcoat.
- d. Topcoat: Latex, exterior flat (Gloss Level 1), MPI #10.
- e. Topcoat: Latex, exterior, low sheen (Gloss Level 3-4), MPI #15.
- f. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

1PART - 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 surface preparation and the application of paint systems on interior substrates.

- 1. Concrete.
- 2. Clay masonry.
- 3. Concrete masonry units (CMU).
- 4. Steel.
- 5. Galvanized metal.
- 6. Wood.
- 7. Gypsum board.

B. Related Requirements:

- 1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.
- 2. Section 099113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.

1.3 DEFINITIONS

- A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- E. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.
- F. Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

B. LEED Submittals:

1. Product Data for Credit EQ 4.2: For paints and coatings, including printed statement of VOC content.
2. Laboratory Test Reports for Credit EQ 4: For paints and coatings, documentation indicating that they meet the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Samples for Initial Selection: For each type of topcoat product.

D. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Step coats on Samples to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

E. Product List: For each product indicated, include the following:

1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
2. Printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.
3. VOC content.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 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 specified in Part 3.

- 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.

1.7 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.

1.8 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 less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

2PART - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by the following:
- 1. Behr Process Corporation.
 - 2. Benjamin Moore & Co.
 - 3. Benjamin Moore & Co. (Canada).
 - 4. Bennette Paint Manufacturing Company, Inc.
 - 5. Betonel Ltd.
 - 6. BLP Mobile Paint Manufacturing.
 - 7. California Paints.
 - 8. Cloverdale Paint.
 - 9. Color Wheel Paints & Coatings.
 - 10. Columbia Paint & Coatings.
 - 11. Conco Paints.
 - 12. Coronado Paint.
 - 13. Davis Paint Company.

14. Diamond Vogel Paints.
15. Dunn-Edwards Corporation.
16. Durant Performance Coatings.
17. Duron, Inc.
18. Envirocoatings Canada Inc.
19. Euclid Chemical Company.
20. Farrell-Calhoun.
21. Frazee Paint.
22. General Paint.
23. Hallman Lindsay Paints.
24. Hirshfield's, Inc.
25. ICI Paints.
26. ICI Paints (Canada).
27. Insl-x.
28. Kelly-Moore Paints.
29. Kwal Paint.
30. M.A.B. Paints.
31. McCormick Paints.
32. Microblend Technologies Inc.
33. Miller Paint.
34. Mills Paint.
35. PARA Paints.
36. Parex LaHabra Inc.
37. Parker Paint Mfg. Co. Inc.
38. PPG Architectural Finishes, Inc.
39. Pratt & Lambert.
40. Rodda Paint Co.
41. Scott Paint.
42. Sherwin-Williams Company (The).
43. Sico, Inc.
44. Southern Diversified Products, LLC.
45. Smith Paint Products.
46. Vista Paint.
47. Zinsser.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.

C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of

colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. Dry-Fog Coatings: 400 g/L.
4. Primers, Sealers, and Undercoaters: 200 g/L.
5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
7. Pretreatment Wash Primers: 420 g/L.
8. Floor Coatings: 100 g/L.
9. Shellacs, Clear: 730 g/L.
10. Shellacs, Pigmented: 550 g/L.

D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

E. Colors: As selected by Architect from manufacturer's full range.

1. 50 percent of surface area will be painted with deep tones.

2.3 BLOCK FILLERS

A. Block Filler, Latex, Interior/Exterior: MPI #4.

2.4 PRIMERS/SEALERS

A. Primer Sealer, Latex, Interior: MPI #50.

B. Primer, Latex, for Interior Wood: MPI #39.

C. Primer, Bonding, Water Based: MPI #17.

2.5 METAL PRIMERS

A. Primer, Rust-Inhibitive, Water Based: MPI #107.

B. Primer, Alkyd, Quick Dry, for Metal: MPI #76.

C. Primer, Galvanized, Water Based: MPI #134.

2.6 WATER-BASED PAINTS

A. Latex, Interior, Flat, (Gloss Level 1): MPI #53.

B. Latex, Interior, (Gloss Level 2): MPI #44.

- C. Latex, Interior, (Gloss Level 3): MPI #52.
- D. Latex, Interior, (Gloss Level 4): MPI #43.
- E. Latex, Interior, Semi-Gloss, (Gloss Level 5): MPI #54.

2.7 FLOOR COATINGS

- A. Sealer, Water Based, for Concrete Floors: MPI #99.

2.8 SOURCE QUALITY CONTROL

- A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings 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.

3PART - EXECUTION

3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
 1. Concrete: 12 percent.
 2. Masonry (Clay and CMU): 12 percent.
 3. Wood: 15 percent.
 4. Gypsum Board: 12 percent.
 5. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. 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 in "MPI Manual" applicable to substrates 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 exceed 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 2, "Hand Tool Cleaning."
2. SSPC-SP 3, "Power Tool Cleaning."
3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and 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 fabricated from coil stock 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 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

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. Uninsulated metal piping.
 - b. Uninsulated plastic piping.
 - c. Pipe hangers and supports.
 - d. Metal conduit.
 - e. Plastic conduit.
 - f. Tanks that do not have factory-applied final finishes.
 - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

2. 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.
- 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. Latex System:
 - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
 - b. Prime Coat: Latex, interior, matching topcoat.
 - c. Intermediate Coat: Latex, interior, matching topcoat.
 - d. Topcoat: Latex, interior, (Gloss Level 4), MPI #43.

- B. Concrete Substrates, Traffic Surfaces:

1. Water-Based Clear Sealer System:
 - a. First Coat: Sealer, water based, for concrete floors, MPI #99.
 - b. Topcoat: Sealer, water based, for concrete floors, MPI #99.

- C. Clay-Masonry Substrates:

1. Latex System:

- a. Prime Coat: Latex, interior, matching topcoat.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, (Gloss Level 3), MPI #52.

D. CMU Substrates:

1. Latex System:

- a. Block Filler: Block filler, latex, interior/exterior, MPI #4.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, (Gloss Level 4), MPI #43.

E. Steel Substrates:

1. Latex over Alkyd Primer System:

- a. Prime Coat: Primer, alkyd, anti-corrosive, for metal, MPI #79 or primer, alkyd, quick dry, for metal, MPI #76.
- b. Prime Coat: Shop primer specified in Section 051200 "Structural Steel Framing" where substrate is specified.
- c. Intermediate Coat: Latex, interior, matching topcoat.
- d. Topcoat: Latex, interior, flat, (Gloss Level 1), MPI #53.
- e. Topcoat: Latex, interior, (Gloss Level 2), MPI #44.
- f. Topcoat: Latex, interior, (Gloss Level 3), MPI #52.
- g. Topcoat: Latex, interior, (Gloss Level 4), MPI #43.
- h. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.
- i. Topcoat: Latex, interior, gloss, (Gloss Level 6, except minimum gloss of 65 units at 60 degrees), MPI #114.

F. Galvanized-Metal Substrates:

1. Latex over Waterborne Primer System:

- a. Prime Coat: Primer, galvanized, water based, MPI #134.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, (Gloss Level 4), MPI #43.
- d. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.

G. Wood Substrates: Including wood trim, architectural woodwork and wood-based panel products.

1. Latex System:

- a. Prime Coat: Primer, latex, for interior wood, MPI #39.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, (Gloss Level 4), MPI #43.
- d. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.

2. Latex over Alkyd Primer System:

- a. Prime Coat: Primer sealer, alkyd, interior, MPI #45.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, (Gloss Level 4), MPI #43.
- d. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.

H. Gypsum Board Substrates:

1. Latex System:

- a. Prime Coat: Primer sealer, latex, interior, MPI #50.
- b. Intermediate Coat: Latex, interior, matching topcoat.
- c. Topcoat: Latex, interior, flat, (Gloss Level 1), MPI #53.
- d. Topcoat: Latex, interior, (Gloss Level 3), MPI #52.
- e. Topcoat: Latex, interior, (Gloss Level 4), MPI #43.

END OF SECTION 099123

SECTION 104413 - FIRE EXTINGUISHER CABINETS

1PART - 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. Fire protection cabinets and mounting brackets for the following:
 - a. Portable fire extinguishers.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.

1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Product Schedule: For fire protection cabinets. Coordinate final fire protection cabinet schedule with fire extinguisher schedule to ensure proper fit and function.

D. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

- 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.

1.5 COORDINATION

- A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- B. Coordinate sizes and locations of fire protection cabinets with wall depths.

2PART - PRODUCTS

2.1 MATERIALS

- A. Aluminum: Alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated, and as follows:
 - 1. Sheet: ASTM B 209 (ASTM B 209M).
 - 2. Extruded Shapes: ASTM B 221 (ASTM B 221M).
- B. Transparent Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), 3 mm thick, with Finish 1 (smooth or polished).

2.2 FIRE PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
 - 1. Products: Subject to compliance with requirements, provide one of the following:
 - a. Fire End & Croker Corporation;.
 - b. J. L. Industries, Inc., a division of Activar Construction Products Group; .
 - c. Kidde Residential and Commercial Division, Subsidiary of Kidde plc;.
 - d. Larsen's Manufacturing Company; Basis of Design - 2409 - 6R.
 - e. Modern Metal Products, Division of Technico Inc.;.
 - f. Moon-American;.
 - g. Potter Roemer LLC;.
 - h. Watrous Division, American Specialties, Inc.;.

- B. Cabinet Construction: Nonrated.

- C. Cabinet Material: Aluminum sheet.

FIRE EXTINGUISHER CABINETS

1. Shelf: Same metal and finish as cabinet.

D. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.

1. Rolled-Edge Trim: 2-1/2-inch (64-mm) backbend depth.

E. Cabinet Trim Material: Aluminum sheet.

F. Door Material: Aluminum sheet.

G. Door Style: Fully glazed 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 manufacturer's standard.

2. Provide manufacturer's standard hinge 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. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.

3. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.

K. Finishes:

a. Interior of cabinet and door.

2. Aluminum: Clear anodic.

2.3 FABRICATION

A. Fire Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.

FIRE EXTINGUISHER CABINETS

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 selected.
1. Fabricate door frames with tubular stiles and rails and hollow-metal design, minimum 1/2 inch (13 mm) thick.
 2. Fabricate 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.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.

3PART - EXECUTION

3.1 EXAMINATION

- A. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

FIRE EXTINGUISHER CABINETS

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.

3.3 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 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 portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.3 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.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

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. JL Industries, Inc.; a division of the Activar Construction Products Group.
 - b. Kidde Residential and Commercial Division.
 - c. Larsens Manufacturing Company.
 - 2. Source Limitations: Obtain fire extinguishers, fire-protection cabinets, and accessories, from single source from single manufacturer.
 - 3. Valves: Manufacturer's standard.
 - 4. Handles and Levers: Manufacturer's standard.
 - 5. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.
- B. Multipurpose Dry-Chemical Type in Steel Container: UL-rated 2-A:10-B:C, 5-lb (2.3-kg) nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

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 finish.
 - 1. Source Limitations: Obtain mounting brackets and fire extinguishers from single source from single manufacturer.
- 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: Top of fire extinguisher to be at 42 inches (1067 mm) above finished floor.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

END OF SECTION 104416

SECTION 312000 – BUILDING EARTHWORK

PART 1 - GENERAL

1.1 WORK INCLUDED

- A. Earthwork requires for this project may include, but is not necessarily limited to:

1. Excavation
2. Filling and backfilling to attain indicated grades.
3. Trenching and trench backfilling.
4. Rough and finish grade of the site.
5. Conservation of topsoil.
6. Proof Rolling.
7. Compaction.

1.2 BENCHMARKS

- A. Maintain two existing benchmarks on the site for references. All vertical dimensions shall be checked from these benchmarks.

1.3 FINISHED GRADES

- A. Finished grades, as used herein, mean the final grade elevations indicated on the drawings. Should finished grades shown on spot elevations conflict with those shown by the contours, the spot elevations shall govern.

1.4 BORROW PITS

- A. Submit representative samples of all fill material requiring compaction to the Designated Testing Laboratory. **Material and borrow pits shall be approved by the Architect prior to filling operations.** If the quantity available from site grading is not sufficient, purchasing, hauling, and blending of fill shall be done by the Contractor.

1.5 CONTROLLED FILL

- A. Class I Fill is all Structural Fill to underside of slabs and to support foundations or footings. Class I Fill shall extend to 10 feet outside the building footprint.

- B. Class II Fill is all Backfill below finish grade immediately behind walls and in trenches and embankments under walks, drives, parking areas, and all areas to be paved. The top two-feet of fill under drives and parking areas shall be Class I Fill. The area shall extend to 10 feet outside paved areas.
- C. Class III Fill is all Backfill used for filling trenches not under paved or building areas.

1.6 DESIGNATED TESTING LABORATORY

- A. Designated Testing Laboratory shall be selected by the Architect and paid by the Owner.
- B. Designated Testing Laboratory shall:
 - 1. Witness proof rolling and make recommendations concerning undercutting loose subgrade areas and surface scarification.
 - 2. Observe and make recommendations concerning surface drainage.
 - 3. Perform Modified Proctor and field density test.
 - 4. Provide advice concerning fill soils on site and the selection of borrow soils.
 - 5. Evaluate the suitability of the subgrade soils at the foundation bearing level.
 - 6. The Designated Testing Laboratory shall report to the Architect in writing, on a daily basis, the results of the tests including a statement that all tests have been performed as required by the specifications.

1.7 COMPACTION TESTING

- A. Existing Subgrade under Building Slabs and Paved Areas: One field density test for each 3,000 sf of building or paved area.
- B. Class I and II Fills: One Field Density Test for each 2,000 sf of building area, 2,000 sf of paved areas after each lift of fill, and one test per 500 lineal feet of trench per one foot lift of fill.
- C. Class III Fills: One field density test per 500 lineal feet of trench at a depth of one foot above pipe.
- D. Exact locations of tests shall be as directed by the Architect. Submit five copies of test reports.

1.8 DENSITY TESTING IN FOUNDATIONS

- A. One test per 50 linear feet of continuous grade beam and monolithic footing subgrade.
- B. One test for every column footing.

1.9 INSUFFICIENT FILL MATERIAL

- A. If quantity of grading material is insufficient to provide finish grade elevations indicated on the drawings, obtain additional fill material of specified quality from an off-site source at no additional cost to the owner.

1.10 EXCESS CUT MATERIAL

- A. If quantity of grading material is in excess of quantities required to provide finished grade elevations indicated on the drawings, any excess material shall be disposed of off-site at no additional cost to the owner.

1.11 DUST CONTROL

- A. Use all means necessary to control dust on and near the Work and on and near all off-site borrow areas if such dust is caused by the Contractor's operations during performance of the Work or is resulting from the condition in which the Contractor leaves the site.
- B. Thoroughly moisten all surfaces as required to prevent dust being a nuisance to the public, neighbors, and concurrent performance of other work on the site.

1.12 MATERIAL PROTECTION

- A. Use all means necessary to protect all materials and existing utilities before, during, and after installation and to protect all objects designated to remain.
- B. In the event of damage, immediately make all repairs and replacements necessary to the approval of the Engineer and at no additional cost to the Owner.

1.13 EXISTING UNDERGROUND FACILITIES

- A. Underground structures and utilities, as indicated, are located according to best available information.
- B. Locate all underground facilities in advance of excavation to avoid conflicts with new construction.

1.14 CONFLICTS

- A. Perform Work in such a manner as to cause a minimum of interference with the service rendered by the facility disturbed.
- B. Immediately repair or replace structures or facilities damaged.
- C. Restore to condition existing prior to damage in accordance with best standard practices as approved by the Engineer and at no additional cost to the Owner.

1.15 SCHEDULING

- A. The Engineer reserves the right to direct the order of work as may be in the best interest of the Owner.

PART 2 - PRODUCTS

2.1 FILL MATERIAL

- A. All fill material shall be subjected to approval of the engineer.
- B. Sand Fill (capillary water barrier) material shall consist of a clean sand with a fineness modulus of 1.6 to 3.1 and containing not more than 10 percent by weight finer than No. 200 U.S. Standard Sieve.
- C. Structural Fill material shall consist of inorganic material free of roots, cobbles and boulders and classified as GM, GC, SW, SP, SM, SC, or CL by ASTM D2487-85 "Standard Methods for Classification of Soils for Engineering purposes". Earth Fill shall also conform to the following:
 - 1. Liquid Limit = 40 maximum
 - 2. Plasticity Index = 15 maximum
 - 3. Dry Unit Weight = 100 Pcf minimum density
 - 4. Unsuitable material includes vegetable matter, sod, muck, roots, rubbish, highly plastic clay soils, and organic soils.
- D. Notification:
 - 1. For approval of imported fill material, notify the Engineer at least four (4) working days in advance of intention to import material, designate the proposed borrow area, and permit the Engineer to sample as necessary from the borrow area for the purpose of making acceptance tests to prove the quality of the material.

2.2 OTHER MATERIALS:

- A. All other materials not specifically described but required for proper completion of the Work of this Section, shall be as selected by the Contractor subject to the approval of the Engineer.

PART 3 - EXECUTION

3.1 GENERAL

- A. Familiarization

1. Prior to all Work of this Section, become thoroughly familiar with the site, the site conditions, and all portions of the Work falling within this Section.

B. Backfilling prior to approvals

1. Do not allow or cause any of the Work performed or installed to be covered up or enclosed by Work of this Section prior to all required inspections, tests, and approvals.
2. Should any of the Work be so enclosed or covered up before it has been approved, uncover all such Work at no additional cost to the Owner.
3. After the Work has been completely tested, inspected, and approved, make all repairs and replacements necessary to restore the Work to the condition in which it was found at the time of uncovering, all at no additional cost to the Owner.

C. Conservation of topsoil

1. When indicated on plans or directed by the Engineer, remove topsoil and spread on areas already graded and prepared, or transport and deposit in storage piles at locations approved by the Engineer.
2. Excavate topsoil to a depth of six (6) inches.
3. Keep topsoil, when stored, separate from other excavated materials.
4. Store or place topsoil free from roots, stones and other undesirable material.
5. Top soil shall be stripped and stockpiled. Disturbed areas not designated as parking, building, sidewalks, or other impervious areas shall receive topsoil to a depth of 6 inches.

3.2 PREPARATION

A. Temporary Drainage

1. Maintain adequate drainage over site while construction is in progress.

B. Unfavorable weather

1. Do not place, spread, or roll any fill material during unfavorable weather conditions.
2. Do not resume fill operations until moisture content and fill density are satisfactory to the Engineer.

3.3 NOT USED

3.4 INSPECTION OF SUBGRADE, PROOF ROLLING, SCARIFYING, AND COMPACTION

- A. After stripping and excavation of the cut areas and removal of unsuitable materials as outlined in the preceding section of this Specification, and prior to filling, the exposed subgrade shall be

approved by the Architect. The exposed subgrade, enclosed by a line drawn 5 feet outside the building and paved areas, shall be predensified and proof rolled by rolling the surface with compaction equipment.

- B. Rolling shall consist of a minimum of eight overlapping coverages in each of two perpendicular directions and shall continue until density test at a depth of 12 inches below the surface indicates the attainment of 95% of the Modified Proctor maximum, ASTM D 1557. In cut areas under building foundations and slabs and pavements, the top one foot of the subgrade shall be compacted to of 95% of the Modified Proctor maximum.
- C. The equipment used for rolling shall be a 20-ton, fully loaded, pneumatic tired tandem axle dump truck.
- D. Proof rolling shall be performed in the presence of the Designated Testing Laboratory Representative.
- E. Soft, loose or unstable surface zones which are detected during proofrolling and compaction shall be scarified and recompacted or undercut and replaced with controlled fill as directed.
- F. Stockpile undercut materials by Fill Material classification in on-site locations where it will not interfere with construction operations. Materials stockpiled shall be placed in a manner to afford drainage. Protect against erosion.
- G. Undercut materials which qualify as Structural Fill may be used in Class I & II Fill areas.

3.5 EXCAVATION

A. General

1. Conform to dimensions, lines, and grades indicated on plans.
2. Transport suitable excavated material and place in fill areas within specified limits of Work and compact as specified.
3. If directed by the Engineer, stockpile excavated material suitable for fill and backfill in approved locations.
4. Remove unsuitable material occurring within or below the limits of excavation to the depth directed by the Engineer. Dispose of excess and unsuitable material outside the limits of Work.
5. Backfill and compact all over excavated areas as specified at no additional cost to the Owner.
6. It shall be the Contractors responsibility to shore excavations where necessary to protect workmen, banks, adjacent paving, structures, utilities, and other existing facilities.

B. Structures

1. Excavated to elevations and dimensions indicated.

2. In stable soil sides and bottom of footing excavations may be cut clean in order that concrete may be poured without forming.
3. In unstable soil extend excavations sufficient distance from footings to allow for placing and removing forms.

C. Ditch excavation

1. Excavate ditches to cross sections and grades indicated on plans.
2. Cut all roots, stumps, and foreign matter in the sides and bottom of ditches to conform to the slope, grade, and shape of the section shown.
3. Exercise care to prevent excavating ditches below grades indicated. Backfill excessive ditch excavation to grade with suitable, thoroughly compacted material.
4. Maintain ditches free from detrimental quantities of leaves, sticks and other debris until final acceptance.

D. Utility Trenches

1. Perform excavation for storm sewers, sanitary sewers, water lines and other utility trenches as specified in sections pertaining to the appropriate utility.

3.6 COMPACTION GENERAL

A. Topsoil

1. Scarify the compacted subgrade, in these areas to receive topsoil, prior to the placing of topsoil, to a depth of two (2) inches to allow the bonding of topsoil with the subsoil.
2. Spread topsoil evenly and compact to elevation, grade and thickness shown on the plans.

B. Plastic Pipe

1. Do not allow compacting equipment to come in direct contact with pipe.
2. Exercise extra care in obtaining adequate compaction under pipe to prevent injurious shear or bending loads.
3. No sharp gravel or object may be placed adjacent to plastic pressure pipe.
4. Remainder of backfill may be placed by standard procedures.
5. Dress off to conform to adjacent contours.
6. Where settlement occurs or improper filling is evident, refill and redress trench to grade.
7. Backfill areas of paving and walks immediately after testing and/or approval of pipe or conduit installation.

8. Maintain surface in paved areas in a smooth riding condition until paving is replaced.
9. Excavated and removed materials:
 - a. Do not include destroyed pavement or walk materials, curbs, and similar material in backfill.
 - b. Unsuitable material such as muck, mud, or other unstable material may be replaced in excavations after suitable material has been placed and compacted to provide two (2) feet of cover over the top of the bell of the pipe except under paved areas, structures or other areas so designated by the Engineer.
 - c. Excavated rock may be used under the same conditions as specified for unsuitable material, provided it is broken into pieces not larger than three (3) inches in diameter.

C. Protection:

1. Protect newly graded areas from the action of the elements.
2. Repair and reestablish to slope and grade any settlement, washing or other damage occurring prior to final acceptance.

3.7 GRADING

A. General

1. Grade all areas as indicated and required.

B. Grading Tolerances

1. Rough grade: ± 0.1 foot
2. Finish grade:
 - a. Beneath concrete slabs of foundations: ± 0.1 foot
 - b. Paved areas: (See sections 32 13 13 and 32 12 16)
 - c. All other areas: ± 0.1 foot
3. Existing surfaces disturbed by construction:
 - a. Grade existing surfaces disturbed by construction as required to provide surfaces a 3:1 slope max unless otherwise approved by Engineer.

3.8 METHOD OF MEASUREMENT

A. Excavation

1. Areas to be excavated will be measured in their original position and final section.
2. Earthwork volume will be determined by the average end-area method of computation.

B. Embankment and Fill Areas

1. Areas to be filled will be measure in their original position and final section.
2. Earthwork volume will be determined by the average end-area method of computation.

C. Rock Excavation

1. Rock will be measured in its original position and final section and its volume determined by the average end-area method of computation except where otherwise noted.
2. Isolated rocks and boulders having a volume less than one half (1/2) cubic yard are not to be measured.
3. Rock excavation will only be measured after the Contractor demonstrates the material cannot be removed by hand pick or by power operated excavator or shovel with rock teeth.

3.9 INSTALLATION OF CLASS I FILL

- A. Class I Fill shall be Structural Fill material.
- B. Compact within + 3 percent of optimum moisture content in 8-inch (maximum) loose layers to a density equivalent to 95 percent of the Modified Proctor Maximum (ASTM D 1557).

3.10 INSTALLATION OF CLASS II FILL

- A. Class II Fill shall be Structural Fill materials except that fill immediately behind walls and under floor slabs as indicated on drawings shall be Sand Fill material.
- B. Compact within $\pm$ 3 percent of optimum moisture content in 8-inch loose layers to a density equivalent to 95 percent of the Modified Proctor Maximum (ASTM D 1557). The top two feet under paved areas and the top one foot for other areas shall be Class I fill.

3.11 INSTALLATION OF CLASS III FILL

- A. Class III Fill may be Structural Fill or Site Fill.
- B. Compact fill in utility trenches not under buildings or paved areas to a density equivalent to 92 percent of the Modified Proctor Maximum (ASTM D 1557).

3.12 INSTALLATION OF BACKFILL

- A. Shore Foundation Walls which are to be tied into floor slabs prior to installation of Backfill and until slabs have been in place sufficient time to achieve strength and provide structural stability against overturning.
- B. Where Backfill is required on both sides of walls, it shall be brought up in even layers so as not to provide an unequal lateral load.
- C. Install Backfill against Foundation Walls only when directed by the Architect, and elsewhere as construction progress permits.

END OF SECTION 312000