

# **PROJECT MANUAL**

**Issued for Permit**

**21 November 2025**

**Volume 1**

## **Oakton College**

### **Adjacencies Renovations – Phase 2a**

**Des Plaines, Illinois**

**Perkins&Will Project Number: 021075.000**

# **Perkins&Will**

**410 N. Michigan Avenue, Suite 1600, Chicago, IL 60611 | 312.755.0770**

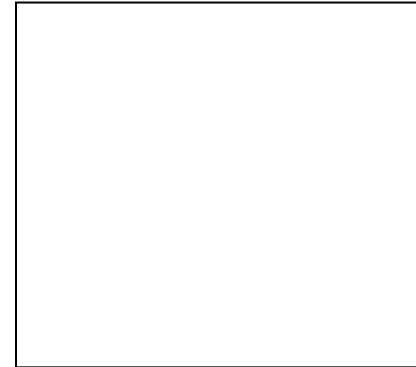
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**PROFESSIONAL SEALS PAGE**

The following Documents and Specification Sections have been prepared by or under the direct supervision of the Architect:

**ARCHITECT**

Perkins&Will  
410 N. Michigan Ave., Suite 1600  
Chicago, IL 60611  
312.755.0770



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The complete Project Manual for this project consists of this entire bound volume which is not to be separated for any reason. The Architect and Owner will not be responsible for any assumptions made by a Contractor or Subcontractor who does not receive a complete bound Project Manual containing all sections and documents listed in the Table of Contents.

The following listed documents comprise the Project Manual for the ADJACENCIES RENOVATIONS – PHASE 2A. Where numerical sequence of Sections or Divisions is interrupted, such interruptions are intentional.

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**END OF DOCUMENT**

## **SECTION 01 10 00**

### **SUMMARY**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Project information.
- B. Work covered by Contract Documents.
- C. Contractor duties.
- D. Access to site.
- E. Protection of persons, work, and property.
- F. Coordination with occupants.
- G. Work restrictions.
- H. Specification and Drawing conventions.
- I. Provisions for electronic media.

##### **1.2 RELATED REQUIREMENTS:**

- A. Section 01 50 00 - Temporary Facilities and Controls for limitations and procedures governing temporary use of Owner's facilities.

##### **1.3 PROJECT INFORMATION**

- A. Project Identification: Oakton College - Adjancies Renovations - Phase 2A
  - 1. Project Location: 1600 Golf Road, Des Plaines, Illinois 60016.
- B. Owner: Oakton College.
- C. Architect Identification: The Contract Documents were prepared for the Project by Perkins&Will, 410 N Michigan Ave, Suite 1600, Chicago, IL 60611; telephone 312-755-0770.
- D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:
  - 1. Mechanical, Electrical and Plumbing:  
MECHANICAL SERVICES ASSOC. CORP.  
11 S. VIRGINIA STREET  
CRYSTAL LAKE, IL 60014

##### **1.4 WORK COVERED BY CONTRACT DOCUMENTS**

- A. The Work of Project is defined by the Contract Documents and consists of the following:



1. Interior renovations for new office space and other Work indicated in the Contract Documents.
- B. Type of Contract:
  1. Project will be constructed under a single prime contract.

#### 1.5 CONTRACTOR DUTIES

- A. VOC Compliance: Ensure that all assemblies, components, and systems comply with all VOC (Volatile Organic Components) requirements and regulations of the Environmental Protection Agency (EPA), Occupational Safety Health Administration (OSHA), State, County, City, and Local Air Control District.
  1. See Divisions 02 through 28 for Project VOC Restrictions.
- B. Except as specifically noted, provide and pay for:
  1. Labor, materials, and equipment.
  2. Tools, construction equipment and machinery.
  3. Water, heat, and utilities required for construction.
  4. Other facilities and services necessary for proper execution and completion of work.
- C. Give required notices.
- D. Comply with all applicable local Building Codes, ordinances, rules, regulations, orders and other legal requirements of public authorities which bear on performance of Work.
- E. Promptly submit written notice to Architect of observed variance of Contract Documents from requirements of authorities having jurisdiction. Assume responsibility for Work known to be contrary to code or regulatory requirements performed without such notice.

#### 1.6 ACCESS TO SITE

- A. General: Contractor shall have limited use of Project site for construction operations as indicated on Drawings by the Contract limits and as indicated by requirements of this Section and by Owner's right to perform work or retain other contractors on portions of the project.
  1. During construction, allow for Owner occupancy and public use of, and access to, existing facilities.
  2. Make each entity engaged in work on the Project aware that the existing facilities house operating functions that must remain in operation during the construction period, except as the Owner may otherwise direct. Plumbing, heating, ventilating, electrical, fire alarm, and telephone systems are to be functional throughout the construction period with a minimum of interruptions in service. Do not block any required fire exits.
  3. Confine operations at Project site to areas permitted by law, ordinances, permits, and Contract Documents.
  4. Do not unreasonably encumber site with materials or equipment that hinders access.
  5. Protect and keep safe products stored on premises.

6. Products and materials are to be stored to not interfere with operations of Owner or other contractors.
  7. Obtain and pay for use of additional storage or work areas needed for operations.
  - B. Use of Site: Limit use of Project site to Work in areas indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.
    1. Limit use of site for work and storage as follows:
      - a. Do not use completed paved areas for storage without Owner's approval.
      - b. Do not store materials within 25 feet of new or existing trees.
      - c. Restrict Work and storage to areas indicated on Drawings or approved by Owner.
      - d. Limit site access to locations approved by Owner.
      - e. Restrict parking to areas approved by Owner.
      - f. Do not perform operations that would interrupt or delay Owner's daily operations.
    2. Driveways, Walkways and Entrances: Keep driveways, loading areas, and entrances serving premises clear and available to Owner, Owner's employees, and emergency vehicles at all times. Do not use these areas for parking or storage of materials.
      - a. 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 onsite.
  - C. Condition of Existing Building: Maintain portions of existing building affected by construction operations in a weathertight condition throughout construction period. Repair damage caused by construction operations.
  - D. Condition of Existing Grounds: Maintain portions of existing grounds, landscaping, and hardscaping affected by construction operations throughout construction period. Repair damage caused by construction operations.
- 1.7 PROTECTION OF PERSONS, WORK, AND PROPERTY
- A. Contractor shall maintain adequate protection of the Work from damage and shall protect the Owner's and adjacent property from injury or loss arising from the Work.
    1. Repair damage to existing buildings, property, and site caused by employees, subcontractors, or consultants.
  - B. Contractor shall provide and always maintain OSHA-required danger signs, guards, and obstructions necessary to protect the public and construction personnel from any dangers inherent with or created by the construction of the Work.
    1. Comply with federal, state, and city rules and requirements pertaining to safety, and all EPA standards, OSHA standards, and NESHAP regulations pertaining to asbestos and other hazardous materials.

## 1.8 COORDINATION WITH OCCUPANTS

- A. Partial Owner Occupancy: Owner will occupy the premises during entire construction period, with the exception of areas under construction. Cooperate with Owner during construction operations to minimize conflicts and facilitate Owner usage. Perform the Work so as not to interfere with Owner's operations. Maintain existing exits unless otherwise indicated.
  - 1. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities. Do not close or obstruct walkways, corridors, or other occupied or used facilities without written permission from Owner and authorities having jurisdiction.
  - 2. Provide not less than 72 hours' notice to Owner of activities that will affect Owner's operations.
- 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. Architect 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. On-Site Work Hours: Limit work in the existing building to normal business working hours of 7 a.m. to 7 p.m., Monday through Friday, unless otherwise indicated.
  - 1. Hours for Core Drilling and other noisy activities: Coordinate with Owner. Perform during hours when building is least occupied.
  - 2. Obtain approval from Owner for work outside of these hours.
- C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:
  - 1. Notify Architect not less than two days in advance of proposed utility interruptions.
  - 2. Obtain Architect's written permission before proceeding with utility interruptions.
- D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, or other disruption to Owner occupancy with Owner.

1. Notify Architect not less than two days in advance of proposed disruptive operations.
2. Obtain Architect's written permission before proceeding with disruptive operations.
- E. Nonsmoking Property: Smoking is not permitted within the building or on Owner's property.
- F. Restricted Substances: Use of tobacco products and other controlled substances within existing building and on Project site is not permitted.
- G. Employee Identification: Provide identification tags for Contractor personnel working on Project site. Require personnel to use identification tags at all times.
- H. Employee Screening: Comply with Owner's requirements for drug and background screening of Contractor personnel working on Project site.
  1. Maintain list of approved screened personnel with Owner's representative.

#### 1.10 SPECIFICATION AND DRAWING CONVENTIONS

- A. Specifications Format: The Specifications are organized into Divisions and Sections using CSI/CSC's "MasterFormat 2020" 50-Division numbering system.
  1. Section Identification: The Specifications use section numbers and titles to help cross-referencing in the Contract Documents. Sections in the Project Manual are in numeric sequence, without all numbers included in the sequence. Consult the Table of Contents at the beginning of the Project Manual to determine numbers and names of sections in the Contract Documents.
  2. The order of articles, paragraphs, subparagraphs, and sub-subparagraphs within the text of any Specification section is defined by a sequence of indentations.
    - a. Article, paragraph and subparagraph titles, and other identifications of subject matter in the Specifications, are intended as an aid in locating and recognizing various requirements in the beginning words of a sentence.
    - b. Specification text shall govern over titling and shall be understood to be interpreted as a whole. Where a title establishes the subject, the titles are subordinate to and do not define, limit, or otherwise restrict the Specification text.
  3. The captions and headings of various subdivisions of the Contract Documents are intended only as a matter of reference and convenience for describing the Work and in no way define, prescribe, or limit the scope or intent of the Contract Documents or any subdivision thereof.
- B. 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. Abbreviated Language: Language used in the Specifications and other Contract Documents is abbreviated. Words and meanings shall be interpreted as appropriate. Words implied, but not stated, shall be inferred as the sense requires. Singular words shall be interpreted as plural, and plural words shall be interpreted as singular where applicable as the context of the Contract Documents indicates.

2. Imperative mood and streamlined language are generally used in the Specifications. Requirements expressed in the imperative mood are to be performed by Contractor. Occasionally, the indicative or subjunctive mood may be used in the Section Text for clarity to describe responsibilities that must be fulfilled indirectly by Contractor or by others when so noted.
  - a. 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.
  - b. Contract Documents may omit modifying words such as "all" or "any," and articles such as "the" or "an." The absence of a modifier or article from one statement that appears in another is not intended to affect the interpretation of either statement.
3. Specification requirements are to be performed by Contractor unless specifically stated otherwise.
4. The Specifications do not:
  - a. Establish trade jurisdictions or divisions of responsibility.
  - b. Define subcontract scopes of work.
- C. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.
- D. Work specified in any one Section is related to, and dependent upon, Work specified in other Sections, whether or not specific reference is made to the Work of other Sections. Cross-references in the Specifications are general references intended as a matter of convenience for aiding in the location general information and are not all-inclusive.
- E. Names, telephone numbers, and website addresses and other contact information listed in the Contract Documents are for convenience only, are subject to change, and are believed to be accurate and up to date as of the printing of the Contract Documents.
- F. Use of the word "including," when following any general statement, shall not be construed to limit such statement to specific items or matters listed, whether or not non-limiting language (such as "without limitation," "but not limited to," or other words of similar import) is used with reference thereto; but rather, shall be deemed to refer to all other items or matters that could reasonably fall within the broadest possible scope of such general statement.
- G. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
  1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
  2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.

1.11 PROVISIONS FOR ELECTRONIC MEDIA

- A. Digital Data Files: Electronic drawing/model files of the Contract Drawings will not be furnished by Architect for Contractor's use in preparing submittals unless procedures stated within Section 01 33 00 - Submittal Procedures are agreed to and Contractor executes the Agreement Form, and the Contractor properly prepares and submits the Submittals Schedule as indicated in Section 01 32 00 - Construction Progress Documentation
- B. For the duration of this Project, it is the intent to distribute information in electronic format where allowable. Drawings, Specifications, Contract Document Modifications, memoranda, letters or other documents issued in the normal course of execution of the Work will be issued and distributed in electronic format (.pdf).
  - 1. Costs associated with printing and distribution of the project information shall be included in the Contract Sum.
  - 2. Printed documents will be provided and expected only for documents that are required to be in paper format by this Contract, Authorities Having Jurisdiction, or other statutory requirements.
    - a. Drawings that require revision will be reissued for replacement as full-size sheets.
    - b. Specifications that require revision will be reissued as complete replacement Specification Sections.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

## **SECTION 01 13 00**

### **DELEGATED DESIGN REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Administrative and procedural requirements for assemblies and construction systems provided by the Contractor as delegated design.

##### **1.2 DEFINITIONS**

- A. Delegated: Delegated by the Owner and Architect to the Contractor.
- B. Design: Planning, coordination, and graphic and written communication of a portion of the Work, including determination and engineering of system or assembly or system organization and structure, in response to functional requirements, arrangement and performance criteria indicated in the Contract Documents.

##### **1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Portions of the Contract Documents delegate the design of certain components, assemblies or systems to the Contractor, or may otherwise specify "delegated design requirements" in individual specification Sections.
- B. Contractor is to be responsible for delegated design Work, including design, engineering and performance.
- C. Drawings of delegated design portions of Work are diagrammatic and are intended only to show:
  - 1. Design intent of finished materials, profiles, shapes and forms.
  - 2. Relationships between elements.
  - 3. Location, identification, dimension and size of components, assemblies and accessories.
  - 4. Schematic attachment details and diagrams of fasteners and connections.
- D. Specifications for delegated design portions of the Work establish performance criteria for materials, products, systems, and methods of execution, along with minimum performance requirements for indicated portions of the Work.
- E. Architect will review informational submittals specified herein to determine whether or not the delegated component, assembly or system design complies with the following:
  - 1. Contractor's engineering shows substantiation of the specified performance criteria.
  - 2. Conforms to specified performance requirements, including those subsequent modifications.
  - 3. Complies with the overall project design.

4. Can be appropriately integrated into the overall design of the project.
  5. Review by the Architect does not relieve the Contractor from compliance with the requirements of the delegated component.
- F. In the event of conflicts regarding the Contractor's proposed delegated design solutions and the design intent of the Contract Documents, the decision of the Architect will be final.

#### 1.4 PROCEDURAL REQUIREMENTS

- A. Design Requirements: Proposed delegated design solutions are to demonstrate compliance with the original design intent of the Contract Documents, as determined by the Architect.
1. Unless otherwise defined by the Contract Documents, appearance of exposed elements, including member sizes, profiles and alignment of components, are to be within dimensional limits of section profiles indicated on the Drawings, and are to be consistent throughout the Project. Do not deviate from profiles, layouts or arrangements indicated without prior written approval from the Architect.
  2. Proposed delegated design solutions that exactly follow details indicated on the Drawings do not relieve Contractor of responsibility for design and performance of delegated design portions of Work.
- B. Engineering Requirements: Engineer delegated design portions of the Work to meet or exceed specified performance requirements, to satisfy the requirements of the authorities having jurisdiction, and to provide structurally sound, water and weathertight assemblies capable of withstanding the specified in-service loads without failure.
- C. Additional Requirements:
1. Fabricate, assemble and install delegated design portions of the Work to accommodate the full range of manufacturing, operating and field installation tolerances of adjacent work specified in other Sections.
  2. If required by the authorities having jurisdiction, submit shop drawings, specifications, calculations and other supporting data necessary for obtaining jurisdiction approval after they have been reviewed by the Architect and prior to beginning installation. Pay fees incurred.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. General: Coordinate and process submittals for delegated design portion of Work in same manner as for other portions of Work.
- B. Design Data:
1. Submit engineering calculations demonstrating compliance with the requirements of Contract Documents and of the authorities having jurisdiction.
    - a. Provide calculations legible and that incorporate sufficient cross-references to shop drawings to make calculations readily understandable and reviewable.
    - b. Test reports are not acceptable as a substitute for calculations.
  2. Structural Calculations: Include the following:
    - a. Analysis of framing members.

#### DELEGATED DESIGN REQUIREMENTS



- b. Section property computations for framing members.
  - c. Analysis of anchors, including anchors embedded in concrete
  - d. Signature and seal of the qualified Engineer responsible for their preparation.
- C. Furnish appropriate certification from licensed fabricator shop or complete detailed inspection reports signed by each inspector performing unlicensed shop inspection to the Architect before the Work affected by these inspections is delivered to the site.

#### 1.6 QUALITY ASSURANCE

- A. Engineer Qualifications: Unless stated otherwise in other sections, provide the following:
  - 1. Professional Engineer legally licensed and qualified to practice in the State of Insert state where project is located and experienced in and having a minimum of 10 consecutive years providing the type of engineering services indicated in the Contract Documents.
  - 2. Engineering services are defined as those performed for the design, fabrication and installation of components and assemblies similar in material, design, complexity and extent to those indicated in the Contract Documents for this Project.
- B. Fabricator/Installer Qualifications: Firm with a minimum of 10 consecutive years' experience in the design, testing, fabrication, assembly, installation and coordination of specified components, assemblies, and systems on projects similar in material, design, complexity and extent to this Project, and whose work has resulted in applications with a record of successful in-service performance. Submit evidence demonstrating the following:
  - 1. Ability to coordinate and work with a qualified testing agency for testing exterior building envelope assemblies utilizing the recognized test standards of the industry on projects similar in material, design, complexity and extent of this Project.
  - 2. Experience in managing, scheduling, coordinating, and maintaining on-time performance in conjunction with the successful projects and for the proposed project.
  - 3. An in-place, comprehensive quality assurance and quality control program and procedures that demonstrates how it is being applied on the project. Describe and demonstrate how the proposed comprehensive quality assurance and quality control program has been successful on other projects.
  - 4. Current resources, including currently employed personnel, to produce the Work to the specified requirements.
  - 5. Ability to produce proposal drawings, accommodate plant visits, and mockups, organization plans, project management plans and proposed schedules in conjunction with the bidding for this Project.
  - 6. Ability to warranty curtain wall systems for 5 years and the curtain wall finishes for 10 years.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- A. Provide products, materials, components and accessories required for a complete installation and operation in the proposed design, whether or not such items are indicated in the Contract Documents.
- B. Provide anchors, attachments, hardware, inserts, fasteners, clips, bracing, framework, and similar items as required to meet specified design and performance requirements, and to anchor delegated design Work to adjacent supports, or to related adjoining work, whether or not such items are indicated in the Contract Documents.

## **PART 3 EXECUTION**

### **3.1 DESIGN**

- A. Unless otherwise indicated or specified, maintain design intent and specified performance requirements of the Contract Documents.
  - 1. If certain fabrication or erection methods, minor dimensional changes and detailing adjustments to the original design in the Contract Documents are required, indicate such on submitted Shop Drawings.
  - 2. Prior to shop drawing submittal, obtain written approval from the Architect for proposed changes and adjustments.
- B. Engage a qualified Engineer to design connection details and determine fastener types and sizes.
  - 1. Fasteners or connections are not to conflict with or require revision to the design profiles indicated on the Drawings or to the supporting work.
  - 2. Connections are not to impose eccentric loading, nor induce twisting or warping to supporting structure.
  - 3. Design connections to accommodate potential and actual misalignment of adjacent work within tolerances specified in other Sections.

## **END OF SECTION**

**SECTION 01 22 00**

**UNIT PRICES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Administrative and procedural requirements for unit prices.

**1.2 RELATED REQUIREMENTS**

- A. Section 01 26 00 - Contract Modification Procedures for procedures for submitting and handling Change Orders.
- B. Section 01 40 00 - Quality Requirements for general testing and inspecting requirements.

**1.3 DEFINITIONS**

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

**1.4 PROCEDURES**

- A. Unit prices include materials, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.
- B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.
- C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

3.1 GENERAL

- A. Refer to individual Sections of Specifications for the descriptions of units of work where the establishment of unit prices is required; the methods of measurement and pricing are specified therein.

3.2 SCHEDULE OF UNIT PRICES

- A. Unit Price No. 01 – Water Vapor Emission Control System: Refer to Section 09 05 61.13 - Moisture Vapor Emission Control.
  - 1. Provide cost per square foot for complete system, including shot-blasting concrete substrate, application of penetrant, post-application moisture and alkalinity testing, application of cementitious underlayment, and manufacturer's 15-year warranty.
- B. Unit Price No. 02 - Hydraulic Cement Based Underlayment: Refer to Section 03 54 16 - Cement-Based Underlayment.
  - 1. Provide cost per square foot for cement-based, polymer-modified, self-leveling underlayment for broad scope leveling of existing and new concrete flowing scheduled to have new flooring applied.

**END OF SECTION**

**SECTION 01 25 00**  
**SUBSTITUTION PROCEDURES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Administrative and procedural requirements for submitting and processing requests for product substitutions after the award of the construction contract.

**1.2 RELATED REQUIREMENTS**

- A. Section 01 21 00 - Allowances for products selected under an allowance.
- B. Section 01 23 00 - Alternates for products selected under an alternate.
- C. Section 01 26 00 - Contract Modification Procedures for determining which modification method and forms are appropriate.
- D. Section 01 60 00 - Product Requirements for requirements for submitting comparable product submittals for products by listed manufacturers.

**1.3 DEFINITIONS**

- A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.
  - 1. Substitutions for Cause: Changes proposed by Contractor that are required due to changed Project conditions, such as unavailability of product, regulatory changes, or unavailability of required warranty terms.
  - 2. Substitutions for Convenience: Changes proposed by Contractor or Owner that are not required in order to meet other Project requirements but may offer advantage to Contractor or Owner.

**1.4 ACTION SUBMITTALS**

- A. Substitution Requests: Electronically submit a PDF copy of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use form provided by Architect.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product, fabrication, or installation cannot be provided, if applicable.

- b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
  - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
  - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
  - e. Samples, where applicable or requested.
  - f. Certificates and qualification data, where applicable or requested.
  - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
  - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
  - i. Research reports evidencing compliance with building code in effect for Project, from model code organization acceptable to the authorities having jurisdiction.
  - j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - k. Cost information, including a proposal of change, if any, in the Contract Sum.
  - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
  - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
- B. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven days of receipt of a request for substitution. Architect will notify Contractor through Construction Manager of acceptance or rejection of proposed substitution within 15 days of receipt of request, or seven days of receipt of additional information or documentation, whichever is later.
- 1. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
  - 2. Acceptance, if granted, will be based on reliance upon data submitted and the opinion, knowledge, information, and belief of the Architect at the time decision is rendered. Approval therefore is interim in nature and subject to reevaluation and reconsideration as additional data, materials, workmanship, and coordination with other work are observed and reviewed.

#### SUBSTITUTION PROCEDURES

3. In proposing items for consideration, Contractor assumes all risk, costs, and responsibility for item's final acceptance, compliance with Contract Documents, integration into the Work, and performance.
4. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

#### 1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.
- B. Substitution Request for products, assemblies, and equipment constitutes a representation that the Contractor:
  1. Has investigated the proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
  2. Has confirmed that the proposed substitution does not affect dimensions or functional clearances.
  3. Agrees to provide the same warranty for the substitution as for the specified product.
  4. Agrees to coordinate installation and make changes to other work that may be required for no additional cost to the Owner.
  5. Waives claims for additional costs or time extension that may subsequently become apparent.

#### 1.6 PROCEDURES

- A. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

#### 1.7 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
  1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - b. Substitution request is fully documented and properly submitted.
    - c. Requested substitution will not adversely affect Contractor's construction schedule.
    - d. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - e. Requested substitution is compatible with other portions of the Work.
    - f. Requested substitution has been coordinated with other portions of the Work.
    - g. Requested substitution provides specified warranty.

- h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.
  - B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after commencement of the Work. Requests received after that time may be considered or rejected at discretion of Architect.
- 1.8 ATTACHMENTS
- A. Post-Award Substitution Request Form.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**



## **SECTION 01 26 00**

### **CONTRACT MODIFICATION PROCEDURES**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Administrative and procedural requirements for handling and processing Contract modifications.

##### **1.2 RELATED REQUIREMENTS**

- A. Section 01 21 00 - Allowances for procedural requirements for handling and processing allowances.
- B. Section 01 22 00 - Unit Prices for administrative requirements for using unit prices.
- C. Section 01 25 00 - Substitution Procedures for administrative procedures for handling requests for substitutions made after the Contract award.
- D. Section 01 31 00 - Project Management and Coordination for administrative procedures for handling RFIs.

##### **1.3 MINOR CHANGES IN THE WORK**

- A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions," or substantially similar form generated by the Architect.

##### **1.4 PROPOSAL REQUESTS**

- A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Proposal Requests issued by Architect are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
  - 2. Contractor's Action: Within 10 days after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
    - a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
    - b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

- c. Include separate costs of labor, materials, equipment and supervision directly attributable to the change.
  - d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  - e. Quotation Form: Use form acceptable to Architect.
- B. Contractor-Initiated Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
  - 1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  - 2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  - 3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  - 4. Include separate costs of labor, materials, equipment and supervision directly attributable to the change.
  - 5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  - 6. Comply with requirements in Section 01 25 00 - Substitution Procedures if the proposed change requires substitution of one product or system for product or system specified.
  - 7. Proposal Request Form: Use form acceptable to Architect.

#### 1.5 ADMINISTRATIVE CHANGE ORDERS

- A. Allowance Adjustment: See Section 01 21 00 - Allowances for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.
- B. Unit-Price Adjustment: See Section 01 22 00 - Unit Prices for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

#### 1.6 CHANGE ORDER PROCEDURES

- A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor on AIA Document G701.

#### 1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
  1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01 29 00**  
**PAYMENT PROCEDURES**

**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.2 RELATED REQUIREMENTS

- A. Section 01 21 00 - Allowances for procedural requirements governing the handling and processing of allowances.
- B. Section 01 22 00 - Unit Prices for administrative requirements governing the use of unit prices.
- C. Section 01 26 00 - Contract Modification Procedures for administrative procedures for handling changes to the Contract.
- D. Section 01 32 00 - Construction Progress Documentation for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.
- E. Section 01 81 13 "Sustainable Design Requirements" for administrative requirements governing submittal of cost breakdown information required for LEED documentation.

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's Construction Schedule.
  - 1. Coordinate line items in the schedule of values with items required to be indicated as separate activities in Contractor's construction schedule.
  - 2. Submit the schedule of values to Architect at earliest possible date, but no later than seven days before the date scheduled for submittal of initial Applications for Payment.
- B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.

1. Identification: Include the following Project identification on the schedule of values:
  - a. Project name and location.
  - b. Name of Architect.
  - c. Architect's project number.
  - d. Contractor's name and address.
  - e. Date of submittal.
2. Arrange the schedule of values in tabular form with separate columns to indicate the following for each item listed:
  - a. Related Specification Section.
  - b. Description of the Work.
  - c. Name of subcontractor.
  - d. Name of manufacturer or fabricator.
  - e. Name of supplier.
  - f. Change Orders (numbers) that affect value.
  - g. Dollar value of the following, as a percentage of the Contract Sum to nearest one-hundredth percent, adjusted to total 100 percent.
    - 1) Labor.
    - 2) Materials.
    - 3) Equipment.
3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.
  - a. Differentiate between items stored on-site and items stored off-site. If required, include evidence of insurance that covers items stored at a bonded warehouse, and during transport to the project site.
4. Provide separate line items in the Schedule of Values for each part of the Work where Applications for Payment may include cost of submittals.
  - a. Cost for submittals shall represent true cost of submittals preparation, as evidenced by subcontractor invoices, but not to exceed 5 percent of the total value of that item of work line item.
5. Allowances: Provide a separate line item in the schedule of values for each allowance. Show line-item value of unit-cost allowances, as a product of the unit cost, multiplied by measured quantity. Use information indicated in the Contract Documents to determine quantities.
6. Overhead Costs: Include total cost and proportionate share of general overhead and profit for each line item.
7. Closeout Costs. Include separate line items under Contractor and principal subcontracts for Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
8. Schedule of Values Revisions: Revise the schedule of values when Change Orders or Construction Change Directives result in a change in the Contract Sum. Include at least one separate line item for each Change Order and Construction Change Directive.

## 1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment following the initial Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
- B. Payment Application Times: The date for each progress payment is the 20th day of each month. The period covered by each Application for Payment starts on the day following the end of the preceding period and ends 15 days before the date for each progress payment.
  - 1. Submit draft copy of Application for Payment seven days prior to due date for review by Architect.
- C. Application for Payment Forms: Use AIA Document G702 and AIA Document G703 as form for Applications for Payment.
  - 1. Other Application for Payment forms proposed by the Contractor shall be acceptable to Architect and Owner. Submit forms for approval with initial submittal of schedule of values.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
  - 1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.
  - 2. Include amounts for work completed following previous Application for Payment, whether or not payment has been received. Include only amounts for work completed at time of Application for Payment.
  - 3. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
  - 4. Indicate separate amounts for work being carried out under Owner-requested project acceleration.
- E. Stored Materials: Include in Application for Payment amounts applied for materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site.
  - 1. Provide certificate of insurance, evidence of transfer of title to Owner, and consent of surety to payment, for stored materials.
  - 2. Provide supporting documentation that verifies amount requested, such as paid invoices. Match amount requested with amounts indicated on documentation; do not include overhead and profit on stored materials.
  - 3. Provide summary documentation for stored materials indicating the following:
    - a. Value of materials previously stored and remaining stored as of date of previous Applications for Payment.
    - b. Value of previously stored materials put in place after date of previous Application for Payment and on or before date of current Application for Payment.
    - c. Value of materials stored since date of previous Application for Payment and remaining stored as of date of current Application for Payment.
- F. Transmittal: Submit PDF of Application for Payment to Architect within 24 hours. Include waivers of lien and similar attachments if required.
  - 1. Provide transmittal form listing attachments and recording appropriate information about application.

- G. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from entities lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
  - 1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  - 2. When an application shows completion of an item, submit conditional final or full waivers.
  - 3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  - 4. Submit final Application for Payment with or preceded by conditional final waivers from every entity involved with performance of the Work covered by the application who is lawfully entitled to a lien.
  - 5. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.
- H. Preparation and Submittal of Draft of Initial Application for Payment (Pencil Copy):
  - 1. Prepare draft copy of Application for Payment and meet with Owner and Architect to review the draft copy prior to submittal of the Application for Payment.
  - 2. Provide four (4) draft (pencil) copies within two (2) business days before the day of the review meeting with Owner and Architect. Submit substantiating data with each application copy: subcontractor applications for payment, copies of invoices, storage receipts, and data required by Owner
  - 3. After review of draft (pencil) copy by Owner, Architect, and Contractor, prepare Application for Payment, using agreed-upon data on Owner/Architect-reviewed schedule of values and Owner/Architect-reviewed pencil draft.
  - 4. Include specified information required for application preparation.
- I. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
  - 1. Copy of executed Agreement between Owner and Contractor.
  - 2. List of subcontractors.
  - 3. Schedule of values.
  - 4. Contractor's construction schedule (preliminary if not final).
  - 5. Products list (preliminary if not final).
  - 6. Schedule of unit prices.
  - 7. Submittal schedule (preliminary if not final).
  - 8. List of Contractor's staff assignments.
  - 9. List of Contractor's principal consultants.
  - 10. Copies of building permits.
  - 11. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  - 12. Initial progress report.
  - 13. Report of preconstruction conference.
  - 14. Certificates of insurance and insurance policies.
  - 15. Performance and payment bonds.
  - 16. Data needed to acquire Owner's insurance.
- J. Payment Applications During Construction: Submit changes in submittals schedule, construction schedule, and other schedules with each application for payment.

- K. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
  - 1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  - 2. This application shall reflect Certificate(s) of Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- L. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
  - 1. Evidence of completion of Project closeout requirements.
  - 2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  - 3. Updated final statement, accounting for final changes to the Contract Sum.
  - 4. Evidence that claims have been settled.
  - 5. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.
  - 6. Final liquidated damages settlement statement.
  - 7. Include documentation that the facility has been inspected by a registered or licensed representative of the state's Department of Licensing and Regulations and that any items noted as non-compliant have been corrected and approved.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**



## **SECTION 01 31 00**

### **PROJECT MANAGEMENT AND COORDINATION**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Requests for Information (RFIs).
  - 3. Digital project information management.
  - 4. Project meetings.

##### **1.2 RELATED REQUIREMENTS**

- A. Section 01 31 06 - Coordination Drawings for coordination drawing requirements.
- B. Section 01 32 00 - Construction Progress Documentation for preparing and submitting Contractor's construction schedule.
- C. Section 01 73 00 - Execution for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
- D. Section 01 77 00 - Closeout Procedures for coordinating closeout of the Contract.

##### **1.3 DEFINITIONS**

- A. BIM: Building Information Modeling.
- B. RFI: Request from Owner, Architect, or Contractor seeking information required for clarifications of the Contract Documents.
- C. PIMS: Web-based Project Information Management System managed by the Contractor and for use by Owner, Owner's Consultants, Architect and Architect's Consultants.

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

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
  - 1. Name, address, telephone number, and email address of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
  - 3. Drawing number and detail references, as appropriate, covered by subcontract.
  - 4. Post list on PIMS and always keep current.

- B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
  - 1. Post copies of list in project meeting room, in temporary field office, on PIMS and in prominent location in built facility. Always keep list current.
- C. Administrative and Personnel: In addition to Project superintendent, identify other administrative and supervisory personnel as required for proper performance of the Work. Identify individuals and their duties and responsibilities; list their addresses and telephone numbers, including home, office, and cellular telephone numbers and email addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.
  - 1. Include personnel required for coordination of operations with other contractors.
- D. Coordination Drawings: Refer to Section 01 31 06 - Coordination Drawings.

#### 1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
  - 4. Where availability of space is limited, coordinate installation of components to ensure maximum performance and accessibility for required maintenance, service, and repair of components, including mechanical and electrical.
- B. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work.
- C. Conservation: Coordinate construction activities to ensure operations are carried out with consideration given to conservation of energy, water, and materials.
  - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into the Work. Refer to other Sections for disposition of salvaged materials that are designated as Owner's property.

#### 1.6 REQUEST FOR INFORMATION (RFI)

- A. General: Immediately on discovery of the need for additional information, clarifications or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
  - 1. Contractor shall submit RFIs to Architect using PIMS.

2. Architect shall provide Contractor with a list of design team contacts by discipline for RFI distribution.
  3. Concurrent with submission to the Architect, Contractor shall also distribute RFIs to appropriate design team professionals, using PIMS, based on the disciplines affected by the RFI.
  4. Architect will return without response those RFIs submitted to Architect by other entities controlled by Contractor.
  5. Coordinate and submit RFIs in a prompt manner to avoid delays in Contractor's work or work of subcontractors.
  6. Include only one subject or item per RFI. RFIs that include more than one subject or item will be returned without review to the Contractor.
- B. Contractor's failure to report discrepancies or omissions in the Contract Documents, or Contractor- or Subcontractor-generated assumptions, in lieu of Architect-issued clarifications regarding the intent of the Contract Documents, shall not be used as a basis for future claims once the apparent discrepancies or omissions have been reconciled by appropriate interpretation issued by the Architect.
- C. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Project number.
  3. Date.
  4. Name of Contractor.
  5. Name of Architect.
  6. RFI number, numbered sequentially.
  7. RFI subject or item.
  8. Specification Section number and title and related paragraphs, as appropriate.
  9. Drawing number and detail references, as appropriate.
  10. Field dimensions and conditions, as appropriate.
  11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  12. Contractor's signature.
  13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- D. RFI Forms: Software-generated form with substantially the same content as indicated above, acceptable to Architect.
1. Attachments shall be electronic files in PDF format.
- E. RFI Submission Procedure:
1. Post electronic submittals as PDF electronic files directly to the Contractor's PIMS as described below.
- F. Architect's Action: Architect will review each RFI, determine action required, and respond as indicated in the project General Conditions. Allow seven working days for Architect's response for each RFI.
1. RFIs received by Architect after 1:00 p.m. in Architect's time zone will be considered as received the following working day.

2. Where the due date for an action or response occurs on a Saturday, Sunday, or legal holiday, such action or response shall be considered due on the next day that is not a Saturday, Sunday, or legal holiday.
3. The following RFIs will be returned without action:
  - a. RFIs addressing more than one subject or item.
  - b. Requests for approval of submittals.
  - c. Requests for approval of substitutions.
  - d. Requests for approval of Contractor's means and methods.
  - e. Requests for approval of nonconforming Work.
  - f. Requests for coordination information already indicated in the Contract Documents.
  - g. Requests for adjustments in the Contract Time or the Contract Sum.
  - h. Requests for interpretation of Architect's actions on submittals.
  - i. Incomplete RFIs or inaccurately prepared RFIs.
4. Architect's action may include a request for additional information, in which case Architect's time for response will begin at the time of receipt by Architect of additional information.
5. RFIs involving requests for recommendations or design assistance on how to address remediation or correction of nonconforming work are not eligible for an increase in Contract Sum or an extension of Contract Time, regardless of when the RFIs are returned, or the corrective action proposed therein.
6. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 26 00 - Contract Modification Procedures.
  - a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within 10 days of receipt of the RFI response.
    - 1) If Contractor's notification is submitted more than 21 days after receipt of the RFI response, any work resulting from the RFI response is not eligible for an increase in Contract Sum or an extension of Contract Time.
7. In the event Contractor requests an accelerated RFI review and response by Architect, Architect will endeavor to accommodate Contractor's request. However, any such desired accelerated review times shall not supersede the requirements of the Contract, and no extension of Contract Time will be authorized because of Architect's failure or inability to adhere to Contractor's desired accelerated review times.
8. Architect will return a response to the RFI via the PIMS.
- G. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Software log with not less than the following:
  1. Project name.
  2. Name and address of Contractor.
  3. Name and address of Architect.
  4. RFI number including RFIs that were returned without action or withdrawn.
  5. RFI description.
  6. Date the RFI was submitted.
  7. Date the RFI response is due.
  8. List of parties the RFI was distributed to.
  9. Date Architect's response was received.

10. Date the RFI was closed by the Contractor.
  11. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
- H. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor disagrees with response.

#### 1.7 DIGITAL PROJECT INFORMATION MANAGEMENT

- A. Use of Architect's Digital Data Files: Digital data files of Architect's BIM model will be provided by Architect for Contractor's use during construction.
1. Digital data files may be used by Contractor in preparing coordination drawings, Shop Drawings, and Project record Drawings.
  2. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Contract Drawings.
  3. Contractor shall execute a data licensing agreement in the form of Agreement included in Project Manual.
- B. Web-Based Project Information System (PIMS): Provide, administer, and use web-based Project software for purposes of hosting and managing Project communication and documentation until Final Completion.
1. PIMS shall be similar to Procore, Ebuilder, Autodesk Construction Cloud or Plangrid but shall include, at a minimum, the following features:
    - a. Project Directory, including Contractor, subcontractors, Architect, Architect's consultants, Owner, and other entities involved in Project. Include names of individuals and contact information.
    - b. Access control for each entity for each workflow process, to determine entity's digital rights to create, modify, view, and print documents.
    - c. Document workflow planning, allowing customization of workflow between project entities.
    - d. Creation, logging, tracking, and notification for Project communications required in other Specification Sections, including, but not limited to, RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders.
    - e. Track status of each Project communication in real time, and log time and date when responses are provided.
    - f. Procedures for handling PDFs or similar file formats, allowing markups by each entity. Provide security features to lock markups against changes once submitted.
    - g. Processing and tracking of payment applications.
    - h. Processing and tracking of contract modifications.
    - i. Creating and distributing meeting minutes.
    - j. Document management for Drawings, Specifications, and coordination drawings, including revision control.
    - k. Management of construction progress photographs.
    - l. Mobile device compatibility, including smartphones and tablets.
    - m. Creating and exporting editable logs for all PIMS functions including, but not limited to: RFIs, submittals, Minor Changes in the Work, Construction Change Directives, and Change Orders. Owner, Architect and Architect's Consultants shall have rights and ability to download logs at any time.

2. Provide up to 20 user licenses for use of Owner, Owner's Commissioning Authority, Architect, and Architect's Consultants. Provide eight hours of software training at Architect's office for web-based Project software users.
3. At completion of Project, change of PIMS or end of Owner-Contractor Contract, provide digital archive in format that is readable by common desktop software applications in format acceptable to Architect. Provide data in locked format to prevent further changes.

#### 1.8 PROJECT MEETINGS

- A. General: Schedule and conduct meetings and conferences at Project site unless otherwise indicated.
  1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and time a minimum of 3 days prior to the meeting date.
  2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees using PIMS.
  3. Minutes: Entity responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes using PIMS to everyone concerned, including Owner and Architect, within three days of the meeting.
- B. Preconstruction Conference: Schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner and Architect, but no later than 15 days after execution of the Agreement.
  1. Conduct the conference to review responsibilities and personnel assignments.
  2. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, Architect's consultants, Contractor, Contractor's superintendent, major subcontractors, suppliers, and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect progress, including but not limited to the following:
    - a. Tentative construction schedule.
    - b. Critical work sequencing and long-lead items.
    - c. Designation of key personnel and their duties.
    - d. Lines of communications.
    - e. Procedures for processing field decisions and Change Orders.
    - f. Procedures for RFIs.
    - g. Procedures for testing and inspecting.
    - h. Procedures for processing Applications for Payment.
    - i. Distribution of the Contract Documents.
    - j. Submittal procedures.
    - k. Digital Execution Plan and associated procedures.
    - l. Preparation of record documents.
    - m. Use of the premises existing building.
    - n. Work restrictions.
    - o. Working hours.
    - p. Owner's occupancy requirements.

- q. Responsibility for temporary facilities and controls.
  - r. Procedures for moisture and mold control.
  - s. Procedures for disruptions and shutdowns.
  - t. Parking availability.
  - u. Office, work, and storage areas.
  - v. Equipment deliveries and priorities.
  - w. First aid.
  - x. Security.
  - y. Progress cleaning.
  - z. Special procedural, inspection and submittal requirements of the Authorities Having Jurisdiction.
4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes using PIMS.
- C. Digital Execution Conference: schedule and conduct a digital execution conference before starting construction, at a time convenient to Owner Architect, and Contractor.
- 1. Attendees: Authorized representatives of Owner, Owner's Commissioning Authority, Architect, Architect's consultants, Contractor, Contractor's superintendent, major subcontractors, suppliers, and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 2. Agenda: Discuss items of significance that could affect the exchange of digital information, including but not limited to the following:
    - a. Electronic file transfer requirements and protocols.
    - b. Right of reliance on Architect's and Architect's Consultants digital files.
    - c. Schedule of digital file transfers and periodic updates.
  - 3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes using PIMS.
- D. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity as indicated in individual Sections.
- 1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Owner's Commissioning Authority of scheduled meeting dates.
  - 2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. Review of mockups.
    - i. Possible conflicts.
    - j. Compatibility requirements.
    - k. Time schedules.
    - l. Weather limitations.

- m. Manufacturer's written instructions.
- n. Warranty requirements.
- o. Compatibility of materials.
- p. Acceptability of substrates.
- q. Temporary facilities and controls.
- r. Space and access limitations.
- s. Regulations of authorities having jurisdiction.
- t. Testing and inspecting requirements.
- u. Installation procedures.
- v. Coordination with other work.
- w. Required performance results.
- x. Protection of adjacent work.
- y. Protection of construction and personnel.
- 3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
- 4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information using PIMS.
- 5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- E. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.
  - 1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  - 2. Attendees: Authorized representatives of Owner, Architect, Architect's consultants, Contractor, Contractor's superintendent, major subcontractors, suppliers, and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Discuss items of significance that could affect or delay Project closeout, including but not limited to the following:
    - a. Preparation of record documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Submittal of written warranties.
    - d. Requirements for preparing operations and maintenance data.
    - e. Requirements for delivery of material samples, attic stock, and spare parts.
    - f. Requirements for demonstration and training.
    - g. Preparation of Contractor's punch list.
    - h. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    - i. Submittal procedures.
    - j. Owner's partial occupancy requirements.
    - k. Installation of Owner's furniture, fixtures, and equipment.
    - l. Responsibility for removing temporary facilities and controls.
    - m. Close of PIMS and export of data to Owner and Architect.



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

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01 31 06**  
**COORDINATION DRAWINGS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Administrative provisions for preparation and submittal of Coordination Drawings and Layout Drawings.

**1.2 RELATED REQUIREMENTS**

- A. Section 01 31 00 - Project Management and Coordination for general project coordination procedures.
- B. Section 01 33 00 - Submittal Procedures for administrative and procedural requirements for submittals.

**1.3 COORDINATION**

- A. Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
- B. Coordinate scheduling and timing of preparation of Coordination Drawings and Layout Drawings with other construction activities to avoid conflicts and to ensure orderly progress of the Work.
- C. In event of conflicts involving location and layout of work; use following priority to resolve conflicts:
  - 1. Structure and partitions have highest priority.
  - 2. Equipment location and access.
  - 3. Ceiling system and recessed light fixtures.
  - 4. Gravity drainage lines.
  - 5. High pressure ductwork and devices.
  - 6. Large pipe mains, valves, and devices.
  - 7. Low pressure ductwork, diffusers, registers, grilles, HVAC equipment.
  - 8. Fire protection piping, devices, and heads.
  - 9. Small piping, tubing, electrical conduit, and devices.
  - 10. Sleeves through fire-resistance-rated partitions.
  - 11. Access panels.

#### 1.4 PROVISION AND USE OF DIGITAL DATA FILES

- A. Digital Data Files: Electronic drawing/model (digital data) files of the Contract Drawings will not be furnished by Architect for Contractor's use in preparing Coordination Drawings and Layout Drawings unless procedures stated within Section 01 33 00 - Submittal Procedures are agreed to, the Contractor executes the Electronic File Transfer Agreement (EFTA) form, and the Contractor properly prepares and submits the Submittals Schedule as indicated in Section 01 32 00 - Construction Progress Documentation.
- B. Release of digital data files are conditional upon the following:
  - 1. The digital data represented in the files are not Contract Documents.
  - 2. Only one set of digital data files will be furnished; Contractor assumes responsibility for distributing pertinent files to the various subcontractors.
  - 3. The digital data files have been developed without the assistance or specific expertise of the individual subcontractors and installers, and therefore do not account for or incorporate means, methods, shop standards, and routing economies required by individual subcontractors for the scope of work required by the finished Work.
  - 4. Modifications to the information and routings of the selected components shown on the digital data files may be required and are the responsibility of the Contractor. All modifications are part of the scope of Work of this Project and shall be provided at no additional cost to Owner.
  - 5. Contractor and subcontractors agree that digital data files are not fit for any particular purpose, including, but not limited to quantity take-offs, pricing, development of a building information model (BIM), dimensional control, clash detection, construction sequencing, or the manufacture of any building component or system.
  - 6. Architect makes no assurances that the digital data files will be usable by the Contractor's and subcontractors' systems, infrastructure, or software; and that the files may be subject to anomalies, errors, viruses, malware, or other unintended defects.
- C. Limitations of Electronic Drawing File Transfer Agreement (EFTA):
  - 1. Agreement Form applies to procurement of Architectural digital data files only. If Contractor desires digital data files for Drawings prepared by one of Architect's consultants, Contractor may contact consultant directly to obtain such files.
  - 2. Contractor shall recognize that various consultants retained by the Architect for this Project, or retained separately by the Owner, may have agreements that differ from that included in the EFTA, and may have differing costs and procedures involved with obtaining digital data files.
  - 3. Architect makes no assertion that the Architect's or Owner's consultants will furnish digital data files of their Drawings. Additionally, not all Drawings or documents may be available electronically.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Electronic files, prepared in either two-dimensional or three-dimensional format at the Contractor's option, and as applicable to the Work being coordinated.

- B. Layout Drawings: Electronic files, prepared in either two-dimensional or three-dimensional format at the Contractor's option, and as applicable to the Work being located.

#### 1.6 QUALITY ASSURANCE

- A. Prior to Start of Work: Require written approval of Coordination Drawings from each subcontractor whose work is contained within the scope of, or is affected by, the Work for which the Coordination Drawings have been prepared.
- B. Coordination Meetings: Schedule with affected trades and subcontractors. Refer to Section 01 31 00 - Project Management and Coordination.

## **PART 2 PRODUCTS**

#### 2.1 DESCRIPTION

- A. Coordination Drawings: Reproducible overlay, or three-dimensional drawings showing work with horizontal and vertical dimensions demonstrating layout of the Work to avoid interference with structural framing, ceilings, partitions, equipment, conveying systems, fire suppression systems, plumbing systems, mechanical systems, electrical systems, lighting, fire alarm systems, telecommunications and A/V systems, electronic safety and security systems, and other services scheduled to be installed in congested or concealed spaces.
- B. Coordination Drawings: Provide for the following items of work:
  - 1. Where required by individual specification Sections.
  - 2. Where installation is not completely shown on Shop Drawings.
  - 3. Where coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
  - 4. Where limited space availability necessitates coordination, including the following areas and spaces:
    - a. In and above ceilings.
    - b. In soffits and furr-downs.
    - c. In insulation space above structural wood decking.
    - d. Within walls.
    - e. Within chases.
    - f. In mechanical spaces.
    - g. In electrical spaces.
- C. Sleeve, Core Drill, and Block-out Layout Drawings: Reproducible overlay or three-dimensional drawings showing proposed locations and sizes of sleeves, core drills, block-outs, and embedded items in concrete walls, columns, floors, and beams.
  - 1. Refer to fire protection, plumbing, HVAC, electrical, and other facility systems Drawings for items penetrating floor, roof, and structural systems.
    - a. Unless otherwise indicated, sleeves shall be provided for all utility and service (Divisions 21 through 28) items scheduled to traverse vertically through the building structure or penetrate structural members, whether or not sleeves have been specifically shown.

2. Core-drilling through structural members, as a substitute for proper layout, coordination, and installation of sleeves, will not be permitted.

## **PART 3 EXECUTION**

### **3.1 COORDINATION DRAWINGS**

- A. General: Prepare Coordination Drawings according to requirements in individual Sections, and additionally where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.
  1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base Coordination Drawings on standard printed data. Include the following information, as applicable:
    - a. Use applicable and most current version of the Contract Drawings as a basis for preparation of Coordination Drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    - b. Coordinate the addition of trade-specific information to the Coordination Drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting for review.
    - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
    - d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
    - e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
    - f. Indicate required installation sequences.
    - g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.
- B. Organize Coordination Drawings as follows:
  1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire protection, fire alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
  2. Plenum Space: Indicate sub-framing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures and other components.

3. Mechanical Rooms: Provide Coordination Drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire protection, fire alarm, and electrical equipment.
4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
6. Mechanical and Plumbing Work: Show the following:
  - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
  - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
  - c. Fire-resistance-rated enclosures around ductwork.
7. Electrical Work: Show the following:
  - a. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
  - b. Reflected Ceiling Plans: Light fixtures, exit lights, emergency battery packs, smoke detectors, fire alarm, and A/V system speakers.
  - c. Panel board, switch board, switchgear, transformer, busway, generator, and motor control center locations.
  - d. For conduit 1-1/4 inches (32 mm) in diameter and larger, show location of pull boxes and junction boxes, dimensioned from column center lines.
8. Fire Protection System: Show the following:
  - a. Locations of standpipes, mains piping, branch lines, pipe drops, and sprinkler heads.
  - b. Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire alarm, A/V, and electrical Work. Show locations of visible ceiling-mounted devices relative to sprinkler heads in acoustical ceiling system grid.

### 3.2 LAYOUT DRAWINGS

- A. Sleeve, Core Drill, and Block-out Layout Drawings: Reproducible overlay drawings showing proposed locations and sizes of sleeves, core drills, block-outs, and embedded items in concrete walls, columns, floors, and beams.
  1. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
  2. Structural Penetrations: Indicate penetrations and openings required for all disciplines. Refer to fire protection, plumbing, HVAC, electrical, and other systems drawings for items penetrating floor, roof, and structural systems.
  3. Core-drilling through structural members, as a substitute for proper layout and installation of sleeves, will not be permitted.
- B. Indicate sleeves for utilities and services scheduled to traverse building structure or penetrate structural members. Indicate size of penetrating item, and size of corresponding sleeve.

1. Call specific attention to Divisions 21 through 28 utilities and services that have been relocated from position originally indicated in Contract Documents, and the reason for such relocation.
  2. Call specific attention to areas where concrete reinforcing or other structural members may require modification in order to accommodate sleeve or block-out.
- C. Indicate areas where access panels are required to gain access to serviceable and maintenance items.

### 3.3 COORDINATION AND LAYOUT DRAWING FORMAT

- A. General: Prepare Coordination Drawing and Layout Drawings according to requirements in Section 01 33 00 - Submittal Procedures.
1. Electronic Digital Data Files: Prepare coordination digital data files according to the following requirements:
    - a. File Submittal Format: Submit or post coordination drawing files using PDF format.
    - b. Perform three-dimensional component conflict analysis as part of preparation of Coordination Drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
  2. Show architectural and structural elements with which the various facility services and systems must be coordinated, including the following:
    - a. Partitions.
    - b. Ceiling heights.
    - c. Structural framing locations and elevations.
    - d. Column lines.
    - e. Other impediments and interferences with installation of the Work.
  3. Show locations of the various facility services and systems, horizontally dimensioned from column center lines, and vertically dimensioned from top of floor slab elevations.
- B. Produce combined Coordination and Layout Drawing plans and sections that fully integrate the various fire suppression systems, plumbing systems, HVAC systems, electrical systems, communications systems, electronic safety and security systems, equipment, and other work.
1. Systems shall be uniquely color-coded for ease of identification.
- C. Prepare Drawings for coordination of installation of products and materials fabricated by separate entities.
1. Indicate relationship of components shown on separate Shop Drawings.
  2. Indicate required installation sequences.
  3. Refer to Divisions 21 through 28 for specific Coordination Drawing requirements for facility services installations.

### 3.4 CONTRACTOR'S ACTION

- A. Produce initial Coordination Drawings within 45 days after initial coordination meeting.
- B. Resolve major interferences at initial coordination meeting prior to production of drawings.



- C. After written approval of Coordination Drawings and Layout Drawings by each affected subcontractor, determine method used to resolve interferences not previously identified.
- D. Give written approval of acceptable changes to Coordination Drawings and Layout Drawings prior to start of work in affected area.
- E. Review Coordination Drawings and Layout Drawings and check for compliance with the Contract Documents. Note corrections, adjustments, and field dimensions. Mark with approval stamp before submitting to Architect.
- F. Distribution: Furnish copies of final Coordination Drawings and Layout Drawings to manufacturers, subcontractors, suppliers, fabricators, installers, and others as necessary for performance of construction activities.
- G. Use for Construction: Retain complete copies of Coordination Drawings and Layout Drawings on Project site and maintain copy in field office at Project Site.

### 3.5 ARCHITECT'S ACTION

- A. Review: Architect will review Coordination Drawings and Layout Drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which remain the Contractor's responsibility. If Architect determines that Coordination Drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor, who shall make changes as directed and resubmit.

### 3.6 ADJUSTING

- A. At no additional cost to the Owner, make the necessary modifications or adjustments required to the Work as a result of the following:
  - 1. Failure to provide complete or correct Coordination Drawings or Layout Drawings for those items of Work.
  - 2. Failure to avoid or resolve conflicts or interferences prior to installation of the Work.
  - 3. Failure to call attention to changes that may be required to adjacent or subsequent Work made necessary as a result of modifications.
- B. Core-drilling and other remedial work resulting from missing or mislocated sleeves shall be provided at no additional cost to Owner.
  - 1. In the event core-drilling severs reinforcing or otherwise weakens the structure, provide additional reinforcing and support as required, as determined by the Structural Engineer, to restore the structure's originally designed load-carrying capability.

### **END OF SECTION**

## **SECTION 01 32 00**

### **CONSTRUCTION PROGRESS DOCUMENTATION**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
  - 1. Contractor's construction schedule.
  - 2. Construction schedule updating reports.
  - 3. Reports:
    - a. Daily construction reports.
    - b. Material location reports.
    - c. Site condition reports.
    - d. Special reports.

##### **1.2 RELATED REQUIREMENTS:**

- A. Section 01 29 00 - Payment Procedures for submitting the Schedule of Values.
- B. Section 01 31 00 - Project Management and Coordination for submitting and distributing meeting and conference minutes.
- C. Section 01 32 33 - Photographic Documentation for submitting construction photographs.
- D. Section 01 33 00 - Submittal Procedures for submitting schedules and reports.
- E. Section 01 40 00 - Quality Requirements for submitting a schedule of tests and inspections.

##### **1.3 DEFINITIONS**

- A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
  - 1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
  - 2. Predecessor Activity: An activity that precedes another activity in the network.
  - 3. Successor Activity: An activity that follows another activity in the network.
- B. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

- C. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.
- D. Event: The starting or ending point of an activity.
- E. Float: The measure of leeway in starting and completing an activity.
  - 1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
  - 2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
  - 3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.
- F. Major Area: A story of construction, a separate building, a separate wing, a major department, or a similar significant construction element.
- G. Milestone: A key or critical point in time for reference or measurement.
- H. Network Diagram: A graphic diagram of a network schedule, showing activities and activity relationships.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Submittals Format: Reference Section 01 33 00 - Submittal Procedures for requirements.
- B. Submittal Schedule: Arrange the following information in a tabular format:
  - 1. Specification Section number and title.
  - 2. Submittal category (action or informational).
  - 3. Name of subcontractor.
  - 4. Description of the Work covered.
  - 5. Scheduled date for first submittal.
  - 6. Date of submission.
  - 7. Scheduled date for Architect and Owner's final release or approval.
  - 8. Fabrication and delivery time frame.
  - 9. Required on job date.
  - 10. Approval date.
- C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
  - 1. Submit a working electronic copy of schedule. Include type of schedule (initial or updated) and date on label.
- D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.
  - 1. Activity Report: List of activities sorted by activity number and then early start date, or actual start date if known.
  - 2. Logic Report: List of preceding and succeeding activities for activities, sorted in ascending order by activity number and then early start date, or actual start date if known.

- 3. Total Float Report: List of activities sorted in ascending order of total float.
- E. Construction Schedule Updating Reports: Submit with Applications for Payment.
- F. Daily Construction Reports: Submit at weekly intervals.
- G. Material Location Reports: Submit as required with monthly payment application.
- H. Site Condition Reports: Submit immediately at time of discovery of differing conditions.
- I. Special Reports: Submit at time of unusual event.

#### 1.5 QUALITY ASSURANCE

- A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 - Project Management and Coordination. Review methods and procedures related to Contractor's construction schedule, including, but not limited to, the following:
  - 1. Review format for reports.
  - 2. Verify availability of qualified personnel needed to develop and update schedule.
  - 3. Discuss constraints, including phasing, work stages, area separations, interim milestones, and partial Owner occupancy.
  - 4. Review delivery dates for Owner-furnished products.
  - 5. Review schedule for work of Owner's separate contracts.
  - 6. Review submittal requirements and procedures.
  - 7. Review time required for review of submittals and resubmittals.
  - 8. Review requirements for tests and inspections by independent testing and inspecting agencies.
  - 9. Review time required for Project closeout and Owner startup procedures.
  - 10. Review and finalize list of construction activities to be included in schedule.
  - 11. Review procedures for updating schedule.

#### 1.6 COORDINATION

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

## **PART 2 PRODUCTS**

#### 2.1 SUBMITTAL SCHEDULE

- A. Preparation: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for initial review, at least one resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates.

1. Initial Submittal: Submit concurrently with preliminary bar-chart schedule. Include submittals required during the first 60 days of construction. List those required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
  2. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.
- B. Restrictions and Limitations:
1. Submittal review and processing times listed in Section 01 33 00 - Submittal Procedures shall be considered baselines and shall take precedence over any lesser times promulgated by Contractor in the Submittal Schedule or Construction Schedule.
  2. No delay claim will be entertained, and no extension of the Contract Time will be authorized due to Contractor's failure to transmit submittals enough in advance of the Work to permit proper and reasonable processing.
  3. If the Contractor fails to submit a Submittal Schedule or fails to provide submittals in accordance with the approved Submittal Schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.

## 2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of Substantial Completion and final completion.
1. Contract completion date shall not be changed by submission of a schedule that shows an earlier or later completion date, unless specifically authorized by Change Order.
- B. Activities: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:
1. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.
  2. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect and Owner.
  3. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  4. Submittal Review Time: Include review and resubmittal times indicated in Section 01 33 00 - Submittal Procedures in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
  5. Startup and Testing Time: Include time as required by Owner for startup and testing. Startup and Testing must be completed by Substantial Completion.
  6. Substantial Completion: Indicate date established for Substantial Completion. Allow time for Architect and Owner's administrative procedures necessary for certification of Substantial Completion.
  7. Punch List and Final Completion: Include time as required by Owner for completion of punch list items and final completion.

8. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule and show how the sequence of the Work is affected.
  1. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
  2. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 - Summary. Delivery dates indicated stipulate the earliest possible delivery date.
  3. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Section 01 10 00 - Summary. Delivery dates indicated stipulate the earliest possible delivery date.
  4. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use of premises restrictions.
    - f. Provisions for future construction.
    - g. Seasonal variations.
    - h. Environmental control.
  5. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - a. Subcontract awards.
    - b. Submittals.
    - c. Purchases.
    - d. Mockups.
    - e. Fabrication.
    - f. Sample testing.
    - g. Deliveries.
    - h. Installation.
    - i. Tests and inspections.
    - j. Adjusting.
    - k. Curing.
  6. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.
- E. Upcoming Work Summary/Look-Ahead Schedule: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
  1. Unresolved issues.
  2. Unanswered Requests for Information.
  3. Rejected or unreturned submittals.

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

## 2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (CPM SCHEDULE)

- A. General: Prepare network diagrams using the Critical Path Method.
- B. Startup Network Diagram: Submit diagram within 14 days of date established for the Notice to Proceed. Outline significant construction activities for the first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.
- C. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.
1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 30 days after date established for the Notice to Proceed.
    - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect and Owner's approval of the schedule.
  2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
- D. CPM Schedule Preparation: Prepare a list of activities required to complete the Work. Using the startup network diagram, prepare a skeleton network to identify probable critical paths.
1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
    - a. Preparation and processing of submittals.
    - b. Mobilization and demobilization.
    - c. Purchase of materials.
    - d. Delivery.
    - e. Fabrication.
    - f. Utility interruptions.
    - g. Installation.
    - h. Work by Owner that may affect or be affected by Contractor's activities.
    - i. Testing.
    - j. Punch list and final completion.
    - k. Activities occurring following final completion.

2. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
  3. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
- E. Contract Modifications: For each proposed contract modification, if applicable and concurrent with its submission, prepare a time-impact analysis to demonstrate the effect of the proposed change on the overall project schedule.
- F. Initial Issue of Schedule: Prepare diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
  2. Description of activity.
  3. Main events of activity.
  4. Immediate preceding and succeeding activities.
  5. Early and late start dates.
  6. Early and late finish dates.
  7. Activity duration in workdays.
  8. Total float or slack time.
- G. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
  2. Changes in early and late start dates.
  3. Changes in early and late finish dates.
  4. Changes in activity durations in workdays.
  5. Changes in the critical path.
  6. Changes in total float or slack time.
  7. Changes in the Contract Time.

## 2.4 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
  2. List of separate contractors at Project site.
  3. Approximate count of personnel at Project site.
  4. Equipment at Project site.
  5. Material deliveries.
  6. High and low temperatures and general weather conditions, including presence of rain or snow.
  7. Accidents.
  8. Meetings and significant decisions.
  9. Unusual events (see special reports).
  10. Stoppages, delays, shortages, and losses.
  11. Meter readings and similar recordings.
  12. Emergency procedures.
  13. Orders and requests of authorities having jurisdiction.



14. Change Orders received and implemented.
  15. Construction Change Directives received and implemented.
  16. Services connected and disconnected.
  17. Equipment or system tests and startups.
  18. Partial completions and occupancies.
  19. Substantial Completions authorized.
  20. Construction photographs with descriptions.
- B. Material Location Reports: At monthly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:
1. Material stored prior to previous report and remaining in storage.
  2. Material stored prior to previous report and since removed from storage and installed.
  3. Material stored following previous report and remaining in storage.
- C. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information in accordance with RFI provisions of Section 01 31 00 - Project Management and Coordination. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

## 2.5 SPECIAL REPORTS

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

## **PART 3 EXECUTION**

### 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Contractor's Construction Schedule Updating: At monthly intervals, update schedule to reflect actual construction progress and activities. Issue schedule with application for payment.
1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.
  2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.

3. As the Work progresses, indicate final completion percentage for each activity.
- B. Distribution: Distribute copies of approved schedule to Architect and Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

**END OF SECTION**

**SECTION 01 32 33**  
**PHOTOGRAPHIC DOCUMENTATION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Administrative and procedural requirements for the following:
  - 1. Construction photographs.
  - 2. Construction video recordings.

**1.2 RELATED REQUIREMENTS:**

- A. Section 01 33 00 - Submittal Procedures for submitting photographic documentation.
- B. Section 01 77 00 - Closeout Procedures for submitting photographic documentation as project record documents at Project closeout.
- C. Section 01 79 00 - Demonstration and Training for submitting video recordings of demonstration of equipment and training of Owner's personnel.

**1.3 ADMINISTRATIVE REQUIREMENTS**

- A. Construction photographs may not be used for Contractor's marketing materials or social media unless approved by Owner.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Digital Photographs: Submit image files within three days of taking photographs.
  - 1. Submit photos electronically. Include copy of key plan indicating each photograph's location and direction.
  - 2. Identification: Provide the following information with each image description in file metadata tag:
    - a. Name of Project.
    - b. Name of Contractor.
    - c. Date photograph was taken.
    - d. Description of location, vantage point, and direction.
    - e. Unique sequential identifier keyed to accompanying key plan.
- B. Video Recordings: Submit video recordings within seven days of recording.
  - 1. Submit video recordings electronically. Include copy of key plan indicating each video's location and direction.
  - 2. Identification: With each submittal, provide the following information in file metadata tag:
    - a. Name of Project.
    - b. Name of Contractor.
    - c. Date video recording was recorded.

- d. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

#### 1.5 FORMATS AND MEDIA

- A. Digital Photographs: Provide color images in JPG format. Photographs should be clear, free from obstruction with appropriate lighting, and easily viewable.
- B. Digital Images: Submit digital media as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.

#### 1.6 CONSTRUCTION PHOTOGRAPHS

- A. General: Take photographs with maximum depth of field and in focus.
  - 1. Maintain key plan with each set of construction photographs that identifies each photographic location.
- B. Preconstruction Photographs: Before commencement of the Work, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
  - 1. Flag construction limits before taking construction photographs.
  - 2. Take photographs to show existing conditions adjacent to property before starting the Work.
  - 3. Take photographs of existing buildings either on or adjoining property, to accurately record physical conditions at start of construction.
  - 4. Take additional photographs as required to record settlement or cracking of adjacent structures, pavements, and improvements.
- C. Concealed Work Photographs: Before proceeding with installing work that will conceal other work, take photographs sufficient in number, with annotated descriptions, to record nature and location of concealed Work.
- D. Periodic Construction Photographs: Take photographs at weekly intervals coinciding with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.
- E. Final Completion Construction Photographs: Take photographs after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.
- F. Additional Photographs: Architect may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.
  - 1. Three days' notice will be given, where feasible.
  - 2. In emergency situations, take additional photographs within 24 hours of request.

#### 1.7 CONSTRUCTION VIDEO RECORDINGS

- A. Preconstruction Video Recording: Before starting demolition and construction, record video recording of Project site and surrounding properties from different vantage points, as directed by Architect.
  - 1. Flag construction limits before recording construction video recordings.

2. Show existing conditions adjacent to Project site before starting the Work.
  3. Show existing buildings either on or adjoining Project site to accurately record physical conditions at the start of demolition and construction.
  4. Show protection efforts by Contractor.
- B. Periodic Construction Video Recordings: Record video recording monthly and coinciding with the cutoff date associated with each Application for payment. Select vantage points to show status of construction and progress since last video recordings were recorded. Minimum recording time shall be 30 minutes(s).

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01 33 00**  
**SUBMITTAL PROCEDURES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

**1.2 RELATED REQUIREMENTS:**

- A. Section 01 29 00 - Payment Procedures for submitting Applications for Payment and the Schedule of Values.
- B. Section 01 31 00 - Project Management and Coordination; for submitting RFIs, issuing meeting minutes, and submitting Coordination Drawings requirements.
- C. Section 01 31 06 - Coordination Drawings for coordination drawing requirements.
- D. Section 01 32 00 - Construction Progress Documentation for submitting schedules and reports, including Contractor's Construction Schedule.
- E. Section 01 32 33 - Photographic Documentation for submitting construction photographs.
- F. Section 01 40 00 - Quality Requirements for submitting test and inspection reports.
- G. Section 01 77 00 - Closeout Procedures for submitting warranties.
- H. Section 01 78 23 - Operation and Maintenance Data for submitting operation and maintenance manuals.
- I. Section 01 78 39 - Project Record Documents for submitting record Drawings, record Specifications, and record Product Data.
- J. Section 01 79 00 - Demonstration and Training for submitting video recordings of demonstration of equipment and training of Owner's personnel.
- K. Division 02 – 33 Specification Sections for submittal requirements specific to the Sections.

**1.3 DEFINITIONS**

- A. Submittals: Written and graphic information and physical samples sent to the for confirmation of the Project design.
- B. Project Information Management System (PIMS): Web-based Project Information Management System managed by the Contractor and for use by Owner, Owner's Consultants, Architect and Architect's Consultants.

- C. Portable Document Format (PDF): An open standard file format licensed by Adobe Systems used for representing documents in a device-independent and display resolution-independent fixed-layout document format.

#### 1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  - 1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  - 2. Submit submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  - 3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  - 4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- B. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  - 1. Initial Review: Allow 10 business days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
  - 2. Resubmittal Review: Allow 10 business days for review of each resubmittal.
- C. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
  - 1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  - 2. Name file with a unique identifier:
    - a. Specification number with no spaces followed by a period.
    - b. Three-digit sequential number followed by a period.
    - c. Two-digit revision number followed by a dash. An initial submittal will use 00 for the revision number.
    - d. Two-character Type Identifier followed by a dash.
      - 1) CT for certificate.
      - 2) IN for informational submittal.
      - 3) PD for product data.
      - 4) QL for qualification information.
      - 5) SA for samples.
      - 6) SD for shop drawing.
      - 7) TR for test report.

#### SUBMITTAL PROCEDURES

- e. Short description of the content, using material designation indicated in the Contract Documents where present.
  - f. Example: 084413.001.00-SD-Curtain Wall CW-1.pdf
- 3. Use submittal schedule to permanently record Contractor's review and approval markings and action taken by Architect and Owner.
- 4. Transmittal Form for Electronic Submittals: Use software-generated form from electronic project management software acceptable to Owner.
- D. Options: Identify options requiring selection by the Architect and Owner.
- E. Deviations: Identify deviations from the Contract Documents on submittals.
  - 1. Clearly identify deviations from the Contract Documents by clouding or other suitable means acceptable to Architect and Owner.
    - a. Provide accompanying detailed written explanation for each deviation.
    - b. Provide the corresponding specification Section labeled with compliance and non-compliance.
- F. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
  - 1. Note date and content of previous submittal.
  - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- G. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- H. Use for Construction: Use only final submittals that are marked with approval notation from Architect's action stamp.

## **PART 2 PRODUCTS**

### **2.1 SUBMITTAL PROCEDURES**

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  - 1. Submit electronic submittals to Architect and Owner using PIMS.
    - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  - 2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
    - a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
  - 3. Test and Inspection Reports Submittals: Comply with requirements specified in Section 01 40 00 - Quality Requirements.

### **SUBMITTAL PROCEDURES**



- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  2. Mark each copy of each submittal to show which products and options are applicable.
  3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  4. For equipment, include the following in addition to the above, as applicable:
    - a. Equipment dimensional drawings.
    - b. Wiring diagrams showing factory-installed wiring.
    - c. Printed performance curves.
    - d. Operational range diagrams.
    - e. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  5. Submit Product Data concurrent with Samples.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data, unless submittal based upon Architect's digital data drawing files is otherwise permitted.
1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
  3. Number and title of applicable Specification Section.

4. Number of Samples: Submit samples as required in individual Specification Sections.
5. Disposition: When possible, maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
  - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
  - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the responsibility of Contractor.
- E. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00 - Project Management and Coordination.
- F. Contractor's Construction Schedule: Comply with requirements specified in Section 01 32 00 - Construction Progress Documentation.
- G. Application for Payment: Comply with requirements specified in Section 01 29 00 - Payment Procedures.
- H. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
- I. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on American Welding Society (AWS) forms. Include names of firms and personnel certified.
- J. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
- K. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- L. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- M. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- N. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- O. Product Test Reports: Submit written reports indicating current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

## SUBMITTAL PROCEDURES

- P. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- Q. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- R. Field Test Reports: Submit reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- S. Maintenance Data: Comply with requirements specified in Section 01 78 23 - Operation and Maintenance Data.
- T. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

## 2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic files signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.
  - 1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
- C. Provide delegated-design drawings to Owner in electronic format.

## **PART 3 EXECUTION**

### 3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.

## SUBMITTAL PROCEDURES

- B. Project Closeout and Maintenance/Material Submittals: Refer to requirements in Section 01 77 00 - Closeout Procedures.
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

### 3.2 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
  - 1. Final Unrestricted Release: When the Architect marks a submittal:
    - a. A - NO EXCEPTIONS
    - b. The Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents. Final payment depends on that compliance.
  - 2. Final-But-Restricted Release: When the Architect marks a submittal:
    - a. B - EXCEPTIONS AS NOTED
    - b. The Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents. Final payment depends on that compliance. Resubmittal is not required for this action.
  - 3. Returned for Resubmittal: When the Architect marks a submittal:
    - a. C – REVISE AND RESUBMIT
    - b. Do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal according to the notations; resubmit without delay. Repeat if necessary to obtain different action mark.
    - c. Do not use, or allow others to use, submittals marked "C- REVISE AND RESUBMIT" at the Project Site or elsewhere where Work is in progress.
  - 4. Returned as Rejected: When the Architect marks a submittal:
    - a. D – REJECTED
    - b. Do not proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. The submittal does not conform to the design concept or meet requirements of the Contract Documents.
    - c. Do not use, or allow others to use, submittals marked "D – REJECTED" at the Project Site or elsewhere where Work is in progress.
  - 5. Returned as received for Information Only: When the Architect marks a submittal:
    - a. E – FOR INFORMATION ONLY
    - b. Proceed with Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. The submittal is acceptable, but the Architect's affirmative action is not required.
  - 6. Returned as Not Reviewed: When the Architect marks a submittal:
    - a. F - NOT REVIEWED
    - b. Submittal is not required by the Contract Documents.

- B. Submittals are reviewed for conformance with the design concept expressed in the Contract Documents. Review is not for the purpose of confirming or approving:
  - 1. Deviation from the Contract Documents, including but not limited to deviation with reference to material, quantity, location, quality, dimension, or orientation (except as expressly annotated in writing by the Architect herein).
  - 2. Means, methods, sequences, or techniques of construction (unless expressly called for in the Contract Documents and herein expressly highlighted for review and approval by the Architect).
  - 3. Safety of the Contractor(s) work, work plan, procedures, workers or of the site.
  - 4. Any clarification of a patent or latent ambiguity or defect in the Contract Documents.
  - 5. Procurement or request for any labor, materials or other expense of the contractor(s) which is in addition to that previously approved by the Owner.
- C. Contractor shall be and shall remain responsible for:
  - 1. Compliance with the Contract Documents.
  - 2. Coordination of the Work (including amongst various trades).
  - 3. Performing the Work in a safe and satisfactory manner.
  - 4. Confirming and correlating quantity and dimensions, and
  - 5. Construction schedule.
- D. Informational Submittals: Architect will review each submittal and will not return it or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
- E. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- F. Incomplete submittals are not acceptable, will be considered non-responsive, and will be returned without review.
- G. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

### 3.3 ATTACHMENTS

- A. Appendix A – Electronic Drawing File Transfer Agreement Form.

### **END OF SECTION**

# Perkins&Will

## Electronic File Transfer Agreement (Contractor – BIM Files)

<b>Name</b>		<b>Date:</b>	
<b>Address</b>		<b>Project Name:</b>	Oakton College Adjacencies Renovations
<b>Description of Data:</b>	Architectural BIM File	<b>PW Project No:</b>	021075.000

The undersigned is a contractor (the “Contractor”) performing services and/or directly or indirectly providing goods and material related to the subject project (the “Project”). The undersigned hereby requests that Perkins&Will and its consultants provide electronic files prepared by Perkins&Will and its consultants for the Project in the form of an electronic model (the “Model Files”). The undersigned acknowledges and agrees that Perkins&Will has no contractual obligation, or any other obligation, to provide the Model Files to the contractor. Perkins&Will agrees to provide the Model Files in consideration for the undertakings of the undersigned. The undersigned agrees that the Contract Documents that Perkins&Will is contractually obligated to prepare and/or deliver are hardcopy drawings and specifications only. The undersigned additionally agrees that the Model Files are not Contract Documents (as that term is defined in or understood to mean in the Owner-Contractor Agreement), do not represent Contract Document modifications, and are not intended to be a substitute for or a supplement to the hardcopy drawings and specifications, or to necessarily represent actual physical conditions on the Project site.

Model Files to be furnished include work prepared by Perkins&Will and its consultant(s) only. The Model Files were prepared by Perkins&Will using the Autodesk® Revit® software platform. Model Files will be furnished in that software platform’s standard format without modifications for the Contractor’s convenience. One set of electronic Model Files will be furnished to the Contractor. The Contractor assumes responsibility for distributing pertinent files to the subcontractors.

The undersigned agrees that the request to provide the Model Files is purely for the convenience of the undersigned and does not constitute the rendering of professional services. Perkins&Will has prepared the Model Files to facilitate the production of the Contract Documents, which are reasonably accurate and complete to the extent of the standard of professional care. The undersigned acknowledges that Perkins&Will does not represent the furnished Model Files as being accurate or complete, as being suitable for the Contractor’s purpose, or as identifying or containing any issue, anomaly, omission, or concern with reference to the Project.

The undersigned agrees and understands that the Model Files, except as expressly set forth above, are not fit for any particular purpose, including but not limited to quantity take-offs; pricing; clash detection; ascertainment of construction or installation tolerances and clearances; preparation of shop drawings, coordination drawings, or fabrication drawings; construction sequencing; or the manufacture of any building component or system. As such, the Model Files, and the information contained in them, and the information that may have been omitted from them, shall not be used as a basis for an increase in the Contract Sum or Contract Time.

The undersigned acknowledges that the Model Files have not necessarily been developed with the assistance or specific expertise of the individual subcontractors and installers, and therefore do not account for or

# Perkins&Will

incorporate means and methods required by individual subcontractors for their scope of the finished Work. Modifications to the information about the components included in the Model Files may be required and are the responsibility of the Contractor to ascertain, coordinate, and implement. All such modifications are part of the scope of Work of this Project and shall be provided at no additional cost to Owner.

The undersigned further acknowledges that Perkins&Will has made no representations to the undersigned that the Model Files are suitable for any purpose other than as expressly set forth above, or will be usable by the undersigned's systems, infrastructure, or software. The undersigned also understands and agrees that the Model Files may be subject to anomalies, errors, viruses, malware, or other unintended defects, and that Perkins&Will has not reviewed or determined whether such defects may be present in any electronic files. Use of these electronic files is solely at the risk of the undersigned.

The undersigned agrees to release any and all claims that they may have at any time against Perkins&Will or its consultants arising out of the use of the Model Files by the undersigned or by any other individual or entity. The undersigned agrees to hold harmless and indemnify Perkins&Will and its consultants from and against all claims, liabilities, losses, damages, and costs, including but not limited to attorney's fees arising from or in any way connected with the provision of the Model Files by Perkins&Will or the use, modification, misinterpretation, misuse, or reuse by others of the Model Files provided by Perkins&Will. The undersigned shall not use, modify, or reproduce any of the Model Files without first removing identifying information for Perkins&Will and its consultants that may be incorporated in the furnished Model Files.

The undersigned confirms that it will use the Model Files only with reference to the Project and shall not copy or distribute the Model Files, or permit the Model Files to be copied or distributed by others, except for use on this Project. The undersigned shall require each Subcontractor, to the extent of the Work to be performed by the Subcontractor, to be bound to the Contractor by the terms and conditions of this Agreement, and to assume toward the Contractor all the obligations and responsibilities that the Contractor, by this Agreement, assumes toward the Owner and Perkins&Will. The undersigned Contractor assumes responsibility for the breach of this Agreement by any Subcontractor to whom the Contractor distributes the Model Files.

Upon return receipt of this signed Agreement, the Model Files will be transmitted to the undersigned through electronic mail, or be posted on the Perkins&Will file transfer protocol site or the Project web site.

This Agreement may be executed in counterpart, and the parties agree that the individual counterparts, taken together, shall constitute a binding agreement.

The undersigned agrees that they are authorized to bind the company indicated below to the obligations of this Agreement, and understands that Perkins&Will is relying upon this representation in agreeing to enter into this Agreement. In addition to any rights that Perkins&Will may have against the company, the undersigned agrees that Perkins&Will shall have rights personally against the undersigned if this apparent authority is questioned or disputed by the company in any way.

The undersigned agrees that any violation of this Agreement by the undersigned or the company, or any of the agents, representatives, officers, or employees of either, will result in irreparable harm to Perkins&Will that cannot be entirely compensated by money damages. Therefore, the undersigned and the company agree that Perkins&Will may seek any and all equitable remedies that may be available to Perkins&Will, including but not limited to a temporary or permanent injunction in the event of any breach or threatened breach of the terms of this Agreement.

The undersigned shall reimburse Perkins&Will for any cost or expense, including attorney's fees and all labor and expenses (including those of in-house counsel), related to the enforcement of the terms of this Agreement.





# Perkins&Will

*Perkins&Will*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Name*

\_\_\_\_\_  
*Title*

\_\_\_\_\_  
*Date*

*Acknowledged and Accepted*

\_\_\_\_\_  
*Signature of Recipient*

\_\_\_\_\_  
*Name*

\_\_\_\_\_  
*Company*

\_\_\_\_\_  
*Title*

**END OF AGREEMENT**

**SECTION 01 40 00**  
**QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

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

**1.2 RELATED REQUIREMENTS**

- A. Section 01 21 00 - Allowances for testing and inspection allowances.
- B. Divisions 02 through 33 Sections for specific test and inspection requirements.

**1.3 DEFINITIONS**

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

- D. Mockups: Full-size, physical example assemblies to illustrate finishes and materials. Mockups are used to verify selections made under Sample submittals, to demonstrate aesthetic effects and, where indicated, qualities of materials and execution, and to review construction, coordination, testing, or operation; they are not Samples. Mockups establish the standard by which the Work will be judged.
- E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.
- F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- G. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).
- H. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

#### 1.4 CONFLICTING REQUIREMENTS

- A. Conflicting Standards and Other Requirements: If compliance with two or more standards or requirements is specified and the standards or requirements establish different or conflicting requirements for minimum quantities or quality levels, inform the Architect regarding the conflict and obtain clarification prior to proceeding with the Work. Refer conflicting requirements that are different, but apparently equal, to Architect for clarification before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified is the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

#### 1.5 DELEGATED DESIGN SERVICES

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

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.
- B. Qualification Data: For Contractor's quality-control personnel.
- C. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility submitted to authorities having jurisdiction before starting work on the following systems:
  - 1. Seismic-force-resisting system, designated seismic system, or component listed in the Statement of Special Inspections.
  - 2. Main wind-force-resisting system or a wind-resisting component listed in the Statement of Special Inspections.
- D. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit a statement, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional, indicating that the products and systems are in compliance with performance and design criteria indicated. Include list of codes, loads, and other factors used in performing these services.

#### 1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

- A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice of Award, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.
- B. Quality-Control Personnel Qualifications: Engage qualified personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.
- C. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.
- D. Monitoring and Documentation: Maintain testing and inspection reports, including log of approved and rejected results. Include Work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming Work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

#### 1.8 REPORTS AND DOCUMENTS

- A. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:
  - 1. Name, address, telephone number, and email address of technical representative making report.

2. Statement on condition of substrates and their acceptability for installation of product.
  3. Statement that products at Project site comply with requirements.
  4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  6. Statement of whether conditions, products, and installation will affect warranty.
  7. Other required items indicated in individual Specification Sections.
- B. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:
1. Name, address, telephone number, and email address of factory-authorized service representative making report.
  2. Statement that equipment complies with requirements.
  3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  4. Statement of whether conditions, products, and installation will affect warranty.
  5. Other required items indicated in individual Specification Sections.
- C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.
- 1.9 QUALITY ASSURANCE
- A. Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units. As applicable, procure products from manufacturers able to meet qualification requirements, warranty requirements, and technical or factory-authorized service representative requirements.
- C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance. Where required by individual Specification Sections, Installer employing workers trained and approved by manufacturer, Installer being acceptable to manufacturer, and/or Installer being an authorized representative of manufacturer for both installation and maintenance.

- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that is similar in material, design, and extent to those indicated for this Project.
- F. Specialists: Certain Specification Sections require that specific construction activities be performed by entities who are recognized experts in those operations. Specialists will satisfy qualification requirements indicated and engage in the activities indicated.
  - 1. Requirements of authorities having jurisdiction supersede requirements for specialists.
- G. Manufacturer's Technical Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect, demonstrate, repair, and perform service on installations of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- I. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:
  - 1. Contractor responsibilities include the following:
    - a. Provide test specimens representative of proposed products and construction.
    - b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
    - c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
    - d. When testing is complete, remove assemblies; do not reuse materials on Project.
  - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

#### 1.10 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
  - 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspection they are engaged to perform.
  - 2. Payment for these services will be made from testing and inspecting allowances, as authorized by Change Orders.

#### QUALITY REQUIREMENTS

3. Costs for retesting and reinspecting construction that replaces or is necessitated by Work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract sum will be adjusted by Change Order.
- B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities, whether specified or not, to verify and document that the Work complies with requirements.
  1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
  2. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
    - a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.
  3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspection will be performed.
  4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  5. Testing and inspection requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Section 01 33 00 - Submittal Procedures.
- D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.
- E. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
  1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Delivery of samples to testing agencies.

6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and quality-control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspection.
  1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- H. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's Construction Schedule. Update and submit with each Application for Payment.
  1. Distribution: Distribute schedule to Owner, Architect, and testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

## **PART 2 PRODUCTS (NOT USED)**

## **PART 3 EXECUTION**

### **3.1 TEST AND INSPECTION LOG**

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

### **3.2 REPAIR AND PROTECTION**

- A. General: On completion of testing, inspection, sample-taking, and similar services, repair damaged construction and restore substrates and finishes.
  1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 73 00 - Execution.
- B. Protect construction exposed by or for quality-control service activities.



- C. Repair and protection are Contractor's responsibility, regardless of the assignment of responsibility for quality-control services.

**END OF SECTION**

## **SECTION 01 42 00**

### **REFERENCES**

#### **PART 1 GENERAL**

##### **1.1 DEFINITIONS**

- A. General: Basic Contract definitions are included in the Conditions of the Contract.
- B. "Approved": When used to convey Architect's action on Contractor's submittals, applications, and requests, "approved" is limited to Architect's duties and responsibilities as stated in the Conditions of the Contract, without any implied meaning extending the Architect's responsibility into the Contractor's area of Contractor coordination, supervision, or means and methods of construction as outlined in the Conditions of the Contract.
  - 1. In no situation will an approval by Architect release Contractor from responsibility to fulfill requirements of the Contract Documents.
- C. "Authorities Having Jurisdiction" (AHJ): Means the agencies, either individually or collectively, charged by statute with administration and enforcement of the requirements of building codes and other regulations at the Project location.
- D. "Directed": A command or instruction by Architect. Other terms including "requested," "authorized," "selected," "required," and "permitted" have the same meaning as "directed."
- E. "General Requirements":
  - 1. Drawings and general provisions of the Contract, including General and Supplementary Conditions (if any) and other Division 01 General Requirement Sections, apply to all sections of the work.
  - 2. The provisions or requirements of Division 01 Sections apply to entire Work of the Contract and where so indicated, to other elements which are included in the Project.
- F. "Indicated": Requirements expressed by graphic representations or in written form on Drawings, in Specifications, and in other Contract Documents. Other terms including "shown," "noted," "scheduled," and "specified" have the same meaning as "indicated."
- G. "Regulations": Laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, and rules, conventions, and agreements within the construction industry that control performance of the Work.
- H. "Furnish": Supply and deliver to Project site, ready for unloading, unpacking, assembly, installation, and similar operations.
- I. "Install": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- J. "Provide": Furnish and install, complete and ready for the intended use.

### **REFERENCES**

- K. "Installer": Means the Contractor or other entity engaged by Contractor as an employee, subcontractor, or sub-subcontractor to perform a particular construction operation at the Project site, including preparation, erection, installation, application, construction, re-installation, and similar operations required for execution of the Work.
1. The term "experienced," when used with the term "installer," means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with the special requirements indicated; and having complied with requirements of authorities having jurisdiction.
  2. Using a term such as "carpentry" does not imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as "carpenter." It also does not imply that requirements specified apply exclusively to trades people of the corresponding generic name.
- L. "Project Site": Space available for performing construction activities. The extent of Project site is shown on Drawings and may or may not be identical with the description of the land on which Project is to be built.

## 1.2 INDUSTRY STANDARDS

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

## 1.3 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Conflicting Requirements: Where compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect for a decision before proceeding.
1. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits.

## REFERENCES

2. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of the requirements. Refer uncertainties to Architect for a decision before proceeding.

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

## **SECTION 01 50 00**

### **TEMPORARY FACILITIES AND CONTROLS**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Requirements for temporary utilities, support facilities, and security and protection of facilities.

##### **1.2 RELATED REQUIREMENTS**

- A. Section 01 10 00 - Summary for work restrictions and limitations on utility interruptions.

##### **1.3 USE CHARGES**

- A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, occupants of Project, testing agencies, and authorities having jurisdiction.
- B. Water and Sewer Service from Existing System: Water from Owner's existing water system is available for use without metering and without payment of use charges. Provide connections, backflow preventers, and extensions of services as required for construction operations.
- C. Electric Power Service from Existing System: Electric power from Owner's existing system is available for use without metering and without payment of use charges. Provide connections and extensions of services as required for construction operations.

##### **1.4 SUBMITTALS**

- A. Informational Submittals:
  - 1. Implementation and Termination Schedule: Within 15 days of date established from commencement of the Work, submit schedule indicating implementation and termination dates of each temporary utility.
  - 2. Project Identification and Temporary Signs: Show fabrication and installation details, including plans, elevations, details, layouts, typestyles, graphic elements, and message content.
  - 3. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire-prevention program.

4. Dust- and HVAC-Control Plan: Submit coordination drawing and narrative that indicates the dust- and HVAC-control measures proposed for use, proposed locations, and proposed time frame for their operation. Identify further options if proposed measures are later determined to be inadequate. Include the following:
  - a. Locations of dust-control partitions at each phase of work.
  - b. HVAC system isolation schematic drawing.
  - c. Location of proposed air-filtration system discharge.
  - d. Waste handling procedures.
  - e. Other dust-control measures.
5. Noise and Vibration Control Plan: Identify construction activities that may impact the occupancy and use of existing spaces within the building or adjacent existing buildings, whether occupied by others, or occupied by the Owner. Include the following:
  - a. Methods used to meet the goals and requirements of the Owner.
  - b. Concrete cutting method(s) to be used.
  - c. Location of construction devices on the site.
  - d. Show compliance with the use and maintenance of quieted construction devices for the duration of the Project.
  - e. Indicate activities that may disturb building occupants and that are planned to be performed during non-standard working hours as coordinated with the Owner.
  - f. Indicate Locations of sensitive equipment areas or other areas requiring special attention as identified by Owner. Indicate means for complying with Owner's requirements.

#### 1.5 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Accessible Temporary Egress: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines, State Accessibility Code, Local Accessibility Code, and ICC/ANSI A117.1.

#### 1.6 PROJECT CONDITIONS

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

## **PART 2 PRODUCTS**

#### 2.1 MATERIALS

- A. Lumber and Plywood: Comply with requirements in Section 06 10 53 - Miscellaneous Carpentry.

- B. Polyethylene Sheet: Reinforced, fire-resistive sheet, 10-mil (0.25-mm) minimum thickness, with flame-spread rating of 15 or less per ASTM E 84 and passing NFPA 701 Test Method 2.
- C. Dust-Control Adhesive-Surface Walk-off Mats: Provide mats minimum 36 by 60 inches (914 by 1624 mm).
- D. Paint: Comply with requirements in Section 09 91 00 - Painting.
- E. Tarpaulins: Fire-resistive labeled with flame-spread rating of 15 or less.

## 2.2 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
  - 1. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
  - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  - 2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction and marked for intended location and application.
  - 3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01 77 00 Closeout Procedures.
- C. Air-Filtration Units: Primary and secondary HEPA-filter-equipped portable units with four-stage filtration. Provide single switch for emergency shutoff. Configure to run continuously.
- D. Electrical Outlets: Properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120-V plugs into higher-voltage outlets; equipped with ground-fault circuit interrupters, reset button, and pilot light.
- E. Power Distribution System Circuits: Where permitted and overhead and exposed for surveillance, wiring circuits, not exceeding 125-V ac, 20-A rating, and lighting circuits may be nonmetallic sheathed cable.

## PART 3 EXECUTION

### 3.1 TEMPORARY FACILITIES, GENERAL

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

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

### 3.2 INSTALLATION, GENERAL

- A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.
  1. Locate facilities to limit site disturbance as specified in Section 01 10 00 - Summary.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

### 3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Water Service: Connect to Owner's existing water service facilities. Clean and maintain water service facilities in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- C. Isolation of Work Areas in Occupied Facilities: Prevent dust, fumes, and odors from entering occupied areas.
  1. Prior to commencing work, isolate the HVAC system in area where work is to be performed according to coordination drawings.
    - a. Disconnect supply and return ductwork in work area from HVAC systems servicing occupied areas.
    - b. Maintain negative air pressure within work area using HEPA-equipped air-filtration units, starting with commencement of temporary partition construction, and continuing until removal of temporary partitions is complete.
  2. Maintain dust partitions during the Work. Use vacuum collection attachments on dust-producing equipment. Isolate limited work within occupied areas using portable dust-containment devices.
  3. Perform daily construction cleanup and final cleanup using approved, HEPA-filter-equipped vacuum equipment.
- D. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
  1. Provide dehumidification systems when required to reduce substrate moisture levels to level required to allow installation or application of finishes.



- E. Electric Power Service: Connect to Owner's existing electric power service. Maintain equipment in a condition acceptable to Owner.
- F. Electric Distribution: Provide receptacle outlets adequate for connection of power tools and equipment.
  - 1. Provide waterproof connectors to connect separate lengths of electrical power cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.
  - 2. Provide warning signs at power outlets other than 110 to 120 V.
  - 3. Provide metal conduit, tubing, or metallic cable for wiring exposed to possible damage. Provide rigid steel conduits for wiring exposed on grades, floors, decks, or other traffic areas.
  - 4. Provide metal conduit enclosures or boxes for wiring devices.
  - 5. Provide 4-gang outlets, spaced so 100-foot (30-m) extension cord can reach each area for power hand tools and task lighting. Provide a separate 125-V ac, 20-A circuit for each outlet.
- G. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
  - 2. Install lighting for Project identification sign.
- H. Electronic Communication (E-mail) Service: Provide temporary electronic communication service, including electronic mail, in common-use facilities.
  - 1. Provide broadband in primary field office.
  - 2. Provide for connection of communication devices Owner, Architect and Contractor by Wi-Fi, or wired connections.

### 3.4 SUPPORT FACILITIES INSTALLATION

- A. Parking: Provide temporary parking areas for construction personnel.
- B. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
  - 1. Identification Signs: Provide Project identification signs as indicated on Drawings.
  - 2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
    - a. Provide temporary, directional signs for construction personnel and visitors.
  - 3. Maintain and touchup signs so they are legible at all times.
- C. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 73 00 - Execution.
- D. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.
  - 1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.

- E. Existing Elevator Use: Use of Owner's existing elevators will be permitted, provided elevators are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore elevators to condition existing before initial use, including replacing worn cables, guide shoes, and similar items of limited life.
  - 1. Do not load elevators beyond their rated weight capacity.
  - 2. Provide protective coverings, barriers, devices, signs, or other procedures to protect elevator car and entrance doors and frame. If, despite such protection, elevators become damaged, engage elevator Installer to restore damaged work so no evidence remains of correction work. Return items that cannot be refinished in field to the shop, make required repairs and refinish entire unit, or provide new units as required.
- F. Existing Stair Usage: Use of Owner's existing stairs will be permitted, provided stairs are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore stairs to condition existing before initial use.
  - 1. Provide protective coverings, barriers, devices, signs, or other procedures to protect stairs and to maintain means of egress. If stairs become damaged, restore damaged areas so no evidence remains of correction work.

### 3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.
  - 1. Where access to adjacent properties is required in order to affect protection of existing facilities, obtain written permission from adjacent property owner to access property for that purpose.
- B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
  - 1. Comply with work restrictions specified in Section 01 10 00 - Summary.
- C. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Coordinate and provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.
- D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- E. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.
- F. Temporary Partitions: Provide floor-to-ceiling dustproof partitions to limit dust and dirt migration and to separate areas occupied by Owner and tenants from fumes and noise.
  - 1. Construct dustproof partitions with gypsum wallboard with joints taped on occupied side, and fire-retardant-treated plywood on construction operations side.

### TEMPORARY FACILITIES AND CONTROLS

2. Construct dustproof partitions with two layers of 6-mil (0.14-mm) polyethylene sheet on each side. Cover floor with two layers of 6-mil (0.14-mm) polyethylene sheet, extending sheets 18 inches (460 mm) up the sidewalls. Overlap and tape full length of joints. Cover floor with fire-retardant-treated plywood.
    - a. Construct vestibule and airlock at each entrance through temporary partition with not less than 48 inches (1219 mm) between doors. Maintain water-dampened foot mats in vestibule.
  3. Where fire-resistance-rated temporary partitions are indicated or are required by authorities having jurisdiction, construct partitions according to the rated assemblies.
  4. Insulate partitions to control noise transmission to occupied areas.
  5. Seal joints and perimeter. Equip partitions with gasketed dustproof doors and security locks where openings are required.
  6. Protect air-handling equipment.
  7. Provide walk-off mats at each entrance through temporary partition.
- G. Temporary Fire-Rated Partitions: Erect and maintain dustproof fire-rated partitions and temporary enclosures to limit dust and dirt migration and to separate occupied areas from construction, fumes, and noise. Fire-rated partitions shall be provided to separate existing occupied areas from construction areas in accordance with NFPA 241
1. Construct fire-rated dustproof partitions of not less than nominal 4-inch (100-mm) studs, 1/2-inch (13-mm) or 5/8-inch (16 mm) Type X gypsum wallboard on both sides, with joints taped.
  2. Extend partitions up to underside of existing structure to the greatest extent possible.
  3. Insulate partitions to provide noise protection to occupied areas.
  4. Seal joints and perimeter with fire-resistant joint sealant.
  5. Equip partitions with dustproof doors and security locks.
    - a. Protect openings in 1-hour fire-rated partitions with 45-minute hollow metal or solid core wood doors.
  6. Protect air-handling equipment.
  7. Weatherstrip openings.
- H. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire-prevention program.
1. Provide fire extinguishers, installed on walls on mounting brackets, visible and accessible from space being served, with sign mounted above.
    - a. Field Offices: Class A stored-pressure water-type extinguishers.
    - b. Other Locations: Class ABC dry-chemical extinguishers or a combination of extinguishers of NFPA-recommended classes for exposures.
    - c. Locate fire extinguishers where convenient and effective for their intended purpose; provide not less than one extinguisher on each floor at or near each usable stairwell.
  2. Store combustible materials in containers in fire-safe locations.
  3. Maintain unobstructed access to fire extinguishers, fire hydrants, temporary fire-protection facilities, stairways, and other access routes for firefighting. Prohibit smoking in hazardous fire-exposure areas.
  4. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition.

5. Permanent Fire Protection: At earliest feasible date in each area of Project, complete installation of permanent fire-protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.
6. Develop and supervise an overall fire-prevention and first-aid fire-protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
7. Prohibit smoking in construction areas.
8. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
9. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.
10. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

### 3.6 MOISTURE AND MOLD CONTROL

- A. Contractor's Moisture-Protection Plan: Avoid trapping water in finished work. Document visible signs of mold that may appear during construction.

### 3.7 OPERATION, TERMINATION, AND REMOVAL

- A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.
- B. Maintenance: Maintain facilities in good operating condition until removal.
  1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.
- C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.
- D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
  1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.

2. Remove temporary roads and paved areas not intended for or acceptable for integration into permanent construction. Where area is intended for landscape development, remove soil and aggregate fill that do not comply with requirements for fill or subsoil. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances that might impair growth of plant materials or lawns. Repair or replace street paving, curbs, and sidewalks at temporary entrances, as required by authorities having jurisdiction.
3. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 77 00 - Closeout Procedures.

**END OF SECTION**

**SECTION 01 60 00**  
**PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

1.1 SECTION INCLUDES

- A. Administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; and comparable products.

1.2 RELATED REQUIREMENTS

- A. Section 01 21 00 - Allowances for products selected under an allowance.
- B. Section 01 23 00 - Alternates for products selected under an alternate.
- C. Section 01 25 00 - Substitution Procedures for requests for substitutions after bid /pricing.
- D. Section 01 42 00 - References for applicable industry standards for products specified.

1.3 DEFINITIONS

- A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.
  - 1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.
  - 2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.
  - 3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.
- B. Basis-of-Design Product Specification: A specification in which a single manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation. Published attributes and characteristics of basis-of-design product establish salient characteristics of products.

1. Evaluation of Comparable Products: In addition to the basis-of-design product description, product attributes and characteristics may be listed to establish the significant qualities related to type, function, in-service performance and physical properties, weight, dimension, durability, visual characteristics, and other special features and requirements for purposes of evaluating comparable products of additional manufacturers named in the specification. Manufacturer's published attributes and characteristics of products for purposes of evaluating comparable products.
  - C. Subject to Compliance with Requirements: Where the phrase "Subject to compliance with requirements" introduces a product selection procedure in an individual Specification Section, provide products qualified under the specified product procedure. In the event that a named product or product by a named manufacturer does not meet the other requirements of the specifications, select another named product or product from another named manufacturer that does meet the requirements of the specifications; submit a comparable product request or substitution request, if applicable.
  - D. Manufacturer's Warranty: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  - E. Special Warranty: Written warranty required by or incorporated into the Contract Documents, either to extend time limit provided by manufacturer's warranty or to provide more rights for Owner.
- 1.4 ACTION SUBMITTALS
- A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
    1. Identification of basis-of-design product, fabrication, or installation method to be replaced, including Specification Section number and title, and Drawing numbers and titles.
  - B. Include data to indicate compliance with the requirements specified in "Comparable Products" Article.
  - C. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 33 00 - Submittal Procedures. Show compliance with requirements.
  - D. Substitution: Refer to Section 01 25 00 - Substitution Procedures for definition and limitations on substitutions.
- 1.5 QUALITY ASSURANCE
- A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.
    1. Each Contractor is responsible for providing products and construction methods compatible with products and construction methods of other contractors.
    2. If a dispute arises between Contractors over concurrently selectable but incompatible products, Architect will determine which products shall be used.

1.6 COORDINATION

- A. Coordinate affected Work as necessary to integrate work of approved comparable products and approved substitutions.

1.7 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

1.8 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  - 1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.



2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.
  - B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
    1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
    2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
    3. See other Sections for specific content requirements and particular requirements for submitting special warranties.
  - C. Submittal Time: Comply with requirements in Section 01 77 00 - Closeout Procedures.
- 1.9 PROHIBITION ON INCORPORATION OF HAZARDOUS MATERIALS
- A. Contractor is responsible for ascertaining that materials within the existing facility, which will be disturbed as part of the work, are free of asbestos containing materials and for performing surveys and/or providing certifications attesting regarding this.
  - B. Architect and its consultants have not knowingly specified for incorporation into the work, materials or products containing hazardous materials or toxic substances (including asbestos).
  - C. Contractor (including its subcontractors, sub-subcontractors, and material suppliers/fabricators under its control) is prohibited from incorporating any material or products into the work containing hazardous materials or toxic substances.
  - D. As part of completed materials and products list required herein, Contractor shall assemble, for the Owner's records, the Material Safety Data Sheets (MSDS) for all materials and products incorporated into the work. These MSD sheets shall be updated upon final completion of the work to incorporate changes which have occurred during the course of the work due to approved substitution requests and other modifications. Architect will not review, nor approve, the MSD sheets. The Contractor, also as a pre-requisite to achieving final completion, shall provide a certificate to the Owner indicating that no hazardous or toxic materials or products were incorporated into the work.
  - E. Architect and its consultants are not responsible for the presence of hazardous materials or toxic substances in or around the work, nor the exposure to persons who construct or subsequently occupy the work. The Architect will not provide certifications regarding the presence or absence of such materials or substances.

## **PART 2 PRODUCTS**

### **2.1 PRODUCT SELECTION PROCEDURES**

- A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
  1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.

## **PRODUCT REQUIREMENTS**

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2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
  3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  4. Where products are accompanied by the term "as selected," Architect will make selection.
  5. Descriptive, performance, and reference standard requirements in the Specifications establish salient characteristics of products.
- B. Product Selection Procedures:
1. Product: Where Specifications name a single manufacturer and product, provide the named product that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    - a. Substitutions may be considered, unless otherwise indicated, when submitted in accordance with provisions of Section 01 25 00 - Substitution Procedures.
  2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
    - a. Substitutions may be considered, unless otherwise indicated, when submitted in accordance with provisions of Section 01 25 00 - Substitution Procedures.
  3. Products:
    - a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
    - b. Nonrestricted List: Where Specifications include a list of names of both available manufacturers and products, provide one of the products listed, or an unnamed product, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product.
      - 1) Substitutions may be considered, unless otherwise indicated, when submitted in accordance with provisions of Section 01 25 00 - Substitution Procedures.
  4. Manufacturers:
    - a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will be considered unless otherwise indicated.
    - b. Nonrestricted List: Where Specifications include a list of available manufacturers, provide a product by one of the manufacturers listed, or a product by an unnamed manufacturer, that complies with requirements. Comply with requirements in "Comparable Products" Article for consideration of an unnamed manufacturer's product.
      - 1) Substitutions may be considered, unless otherwise indicated, when submitted in accordance with provisions of Section 01 25 00 - Substitution Procedures.

5. Available Manufacturers: Where Specification paragraphs or subparagraphs titled "Available Manufacturers" introduce a list of manufacturers' names, provide a product by one of the manufacturers listed or another manufacturer that complies with requirements. Comply with provisions in "Comparable Products" Article to obtain approval for use of an unnamed product.
6. Product Options: Where Specification paragraphs titled "Product Options" indicate that size, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide either the specific product or system indicated or a comparable product or system by another manufacturer.
  - a. Submitted in accordance with provisions of Section 01 25 00 - Substitution Procedures.
7. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.
  - a. Substitutions may be considered, unless otherwise indicated, when submitted in accordance with provisions of Section 01 25 00 - Substitution Procedures.
- C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.
  1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 25 00 - Substitution Procedures for proposal of product.
- D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.
  1. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that does not include premium items.
  2. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from manufacturer's product line that includes both standard and premium items.
  3. Full Industry Range: Where Specifications include the phrase "full industry range of colors, patterns, textures" or similar phrase, Architect will select color, pattern, or texture from any listed manufacturer's product line that includes both standard and premium items.
  4. "Custom Color as selected by Architect" or "to match color on file in Architect's office", "match Architect's sample" means that the color selected is custom and requires custom formulations and submissions of color to obtain Architect's approval prior to application.

- E. Allowances: Refer to individual Specification Sections and "Allowance" provisions in Division 01 for allowances that control product selection and for procedures required for processing such selections.

## 2.2 COMPARABLE PRODUCTS

- A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:
  - 1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.
  - 2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
  - 3. Evidence that proposed product provides specified warranty.
  - 4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.
  - 5. Samples, if requested.
- B. Submitted in accordance with provisions of Section 01 25 00 - Substitution Procedures.

## **PART 3 EXECUTION (NOT USED)**

### **END OF SECTION**

## **SECTION 01 73 00**

### **EXECUTION**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. General administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. Installation of the Work.
  - 2. Coordination of Owner-installed products.
  - 3. Progress cleaning.
  - 4. Starting and adjusting.
  - 5. Protection of installed construction.

##### **1.2 RELATED REQUIREMENTS**

- A. Section 01 10 00 - Summary for limits on use of Project site.
- B. Section 01 33 00 - Submittal Procedures for submitting surveys.
- C. Section 01 73 29 - Cutting and Patching.
- D. Section 01 77 00 - Closeout Procedures for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
- E. Section 02 41 19 - Selective Demolition for demolition and removal of selected portions of the building.
- F. Section 07 84 13 - Penetration Firestopping for patching penetrations in fire-rated construction.

##### **1.3 DEFINITIONS**

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

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

- A. Landfill Receipts: Submit copy of receipts issued by a landfill facility, licensed to accept hazardous materials, for hazardous waste disposal.

1.5 QUALITY ASSURANCE

- A. 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.
- 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. Examination of the Site and Records of Existing Construction and Conditions: Examine the site, the records of existing construction, and the conditions under which the Work is to be performed. Notify the Architect immediately if existing conditions discovered will affect the Work as shown on the Contract Documents
- B. Existing Conditions Depicted in the Contract Documents: The Contract Documents are based upon the information furnished to the Architect by the Owner. Such information is available from the Owner. The records are furnished for information only and may not represent all conditions that will be encountered. The records of existing construction represent conditions known to the Owner. Other construction, of which no records are available, may be encountered. Dimensions of existing construction are based on information provided to the Architect by the Owner. The Contractor and each subcontractor shall field verify dimensions of existing conditions.
- C. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.
  - 1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
  - 2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
  - 3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- D. 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.
- E. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Existing Utility Information: Furnish information to local utility that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.
- B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 31 00 - Project Management and Coordination.

### 3.3 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 and 90 inches (2300 mm) in unoccupied spaces.
- B. Precautions Against Movement or Settlement: The Contractor shall take precautions, including bracing, shoring, underpinning, or other retaining structures, to guard against movement or settlement of existing or new construction. Assume responsibility for the design, safety, and support of such construction, and for movement, settlement, damage, or injury resulting from the construction.
- C. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- D. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

- E. 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.
- F. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.
- G. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- H. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- I. 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.
- J. 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.
- K. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.4 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.

### 3.5 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. Comply with waste disposal requirements in Section 01 50 00 - Temporary Facilities and Controls.
- 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 assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.
- 3.6 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.
- D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 40 00 - Quality Requirements.

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

**END OF SECTION**

**SECTION 01 73 29**  
**CUTTING AND PATCHING**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. General administrative and procedural requirements for cutting and patching.

**1.2 DEFINITIONS**

- A. Cutting: Removal of in-place construction necessary to permit installation or performance of subsequent work.
- B. Patching: Fitting and repair work required to restore construction to original conditions after installation of subsequent work.
- C. Cutting and patching is performed for coordination of the Work, to uncover Work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes.
- D. Restoring or removing and replacing non-complying work is specified separately from cutting-and-patching but may require cutting-and-patching operations as specified herein.

**1.3 PREINSTALLATION MEETINGS**

- A. Cutting and Patching Conference: Conduct conference at Project site.
  - 1. Coordinate with Owner if Cutting and Patching Conference will be required.
  - 2. 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. Inform Architect of scheduled meeting. 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 affected by cutting and patching operations.
  - 3. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

**1.4 SUBMITTALS**

- A. Cutting and Patching Plan: Submit plan describing procedures at least 10 days prior to the time cutting and patching will be performed. Include the following information:
  - 1. Coordinate with Owner if Cutting and Patching Plan will be required.

2. Extent: Describe reason for and extent of each occurrence of cutting and patching.
3. 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.
4. Products: List products to be used for patching and firms or entities that will perform patching work.
5. Dates: Indicate when cutting and patching will be performed.
6. 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. Comply with requirements for and limitations on cutting and patching of construction elements.
  1. Structural Elements: When cutting and patching structural elements, or when encountering the need for cutting and patching of elements whose structural function is not known, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural elements during cutting and patching. Do not cut and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.
  2. Operational Elements: Do not cut and patch operating elements and related components in a manner that results in reducing their capacity to perform as intended or that results in increased maintenance or decreased operational life or safety.
  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.
  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.

#### 1.6 WARRANTY

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

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- A. Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.
  - 1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Owner and Architect for the visual and functional performance of in-place materials. Use materials that are not considered hazardous.
- C. Materials to be cut and patched include those damaged by the performance of the Work.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

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

### **3.2 PREPARATION**

- A. 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.
- B. Temporary Support: Provide temporary support of Work to be cut.
- C. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.
- D. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.
- E. Existing Services: Where existing services are required to be removed, relocated, or abandoned, bypass such services before cutting to avoid interruption of services to occupied areas.

### 3.3 PERFORMANCE

- A. General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
  - 1. Cut 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. 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.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as practicable, as judged by Architect. Provide materials and comply with installation requirements specified in other Sections, where applicable.
  - 1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.
  - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
  - 3. Floors and Walls: Where walls or partitions that are removed extend one finished area into another, patch and repair floor and wall surfaces in the new space. Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.
    - a. Where patching occurs in a painted surface, prepare substrate, and apply primer and intermediate paint coats appropriate for substrate over the patch, and apply final paint coat over entire unbroken surface containing the patch, corner to corner of wall and edge to edge of ceiling. Provide additional coats until patch blends with adjacent surfaces.
  - 4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.
  - 5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.
- D. Fire Rated Construction: At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material in accordance with Section 07 84 13 - Penetration Firestopping, to full thickness of the penetrated element.
- E. Roofing: Where penetrations are made through the roof system to accommodate mechanical, electrical, or plumbing systems, or any other reason associated with the Work, repair in accordance with the original manufacturer's requirements. Install curbs, cants, flashing and other roof system components in accordance with Specifications within this Project Manual and recommendations by the manufacturer of the roof system presently in place. Return assembly to weather-tight condition. Also refer to Division 07 Section on roof modifications or repairs.

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

**END OF SECTION**

**SECTION 01 77 00**  
**CLOSEOUT PROCEDURES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. 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.

**1.2 RELATED REQUIREMENTS**

- A. Section 01 31 00 - Project Management and Coordination for Web-based Project Information Management System.
- B. Section 01 32 33 - Photographic Documentation for submitting final completion construction photographic documentation.
- C. Section 01 73 00 - Execution for progress cleaning of Project site.
- D. Section 01 78 23 - Operation and Maintenance Data for operation and maintenance manual requirements.
- E. Section 01 78 39 - Project Record Documents for submitting record Drawings, record Specifications, and record Product Data.
- F. Section 01 79 00 - Demonstration and Training for requirements for instructing Owner's personnel.
- G. Divisions 03 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

**1.3 DEFINITIONS**

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

**1.4 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data: For cleaning agents.



2. Contractor's List of Incomplete Items: Initial submittal at time of request for Substantial Completion Inspection.
  3. Certified List of Incomplete Items: Final submittal at Final Completion.
- B. Closeout Submittals:
1. Certificates of Release: From authorities having jurisdiction.
  2. Certificate of Insurance: For continuing coverage.
  3. Field Report: For pest control inspection.
- C. Maintenance Material Submittals:
1. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.

## 1.5 SUBSTANTIAL COMPLETION PROCEDURES

- A. "Substantial Completion" is the stage in the progress of Work when Work or designated portion thereof is sufficiently complete in accordance with Contract Documents so Owner can occupy or utilize Work for use which it is intended.
1. Work will not be considered suitable for Substantial Completion review until all systems and equipment are operational; all designated or required governmental inspections and certifications have been made and posted, designated instruction of Owner's personnel in operation of systems and equipment has been completed, operation and maintenance data has been satisfactorily turned over to the Owner, and all finishes are in place. In general, the only remaining Work shall be minor in nature, such that the Owner could occupy project or designated portion thereof on following day, and completion of Work by Contractor would not materially interfere or hamper Owner's normal business operations.
  2. Contractor shall certify that all remaining Work will be completed within a reasonable time, agreed upon by Owner, following date of Substantial Completion. Failure of the Contractor to complete the Work within the stipulated time shall automatically re-institute the provisions for liquidated damages due Owner as contained elsewhere in Contract Documents, or as provided by law for such period of time as may be required by Contractor to fully complete Work whether Owner has occupied the Project or not.
- B. Contractor's List of Incomplete Items: Using Web-based Project Information Management Systems, 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.
- C. 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.
    - a. State accessibility standards inspection.
    - b. Accessibility standard inspection for compliance with ANSI A117.1, Americans with Disabilities Act Accessibility Guidelines (ADAAG) and local requirements if more stringent.

## CLOSEOUT PROCEDURES

2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion construction photographic documentation, damage or settlement surveys, property surveys, and similar final record information.
  3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
  4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.
    - a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect's signature for receipt of submittals.
  5. Submit test/adjust/balance records.
  6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
- D. Procedures Prior to Substantial Completion: Complete the following a minimum of 10 days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.
1. Advise Owner of pending insurance changeover requirements.
  2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  3. Complete startup and testing of systems and equipment.
  4. Perform preventive maintenance on equipment used prior to Substantial Completion.
  5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 79 00 - Demonstration and Training.
  6. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs and photographic negatives, damage or settlement surveys, property surveys, and similar final record information.
  7. Advise Owner of changeover in heat and other utilities.
  8. Participate with Owner in conducting inspection and walkthrough with local emergency responders.
  9. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  10. Complete final cleaning requirements, including touchup painting.
  11. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

- E. 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 and the Contractor's list of incomplete items, 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. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
  - 2. Results of completed inspection will form the basis of requirements for final completion.

#### 1.6 FINAL COMPLETION PROCEDURES

- A. Submittals Prior to Final Completion: Before requesting final inspection for determining final completion, complete the following:
  - 1. Submit a final Application for Payment according to Section 01 29 00 - Payment Procedures.
  - 2. Certified List of Incomplete Items: Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  - 3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  - 4. Submit pest-control final inspection report.
- B. Inspection: Submit a written request for final inspection to determine acceptance a minimum of 10 days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
  - 1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

#### 1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

- A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction. Use CSI Form 14.1A or substantially similar form, and forward to Architect at time of request for Substantial Completion inspection. Architect may use same form for Architect's supplemental items to Contractor.
  - 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
  - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  - 3. Include the following information at the top of each page:
    - a. Project name.

- b. Date.
- c. Name of Architect.
- d. Name of Contractor.
- e. Page number.
- 4. Submit list of incomplete items in the following format:
  - a. PDF electronic file. Architect will return annotated file.

#### 1.8 ACCESSIBILITY STANDARD INSPECTION

- A. Provide inspection at Substantial Completion of facility in accordance with rules and regulations of the Americans with Disabilities Act Accessibility Guidelines (ADAAG) for the purpose of determining compliance with ADAAG. Inspector must be licensed with the state fire marshal to perform the required inspection.
- B. Upon receipt of Inspector's report, immediately make corrections of any reported non-compliant items. Provide documentation to Owner of completed corrective measures.

#### 1.9 OPERATION AND MAINTENANCE MANUALS

- A. Refer to Section 01 78 23 - Operation and Maintenance Data.

#### 1.10 PROJECT RECORD DOCUMENTS

- A. Refer to Section 01 78 39 - Project Record Documents.

#### 1.11 SUBMITTAL OF PROJECT WARRANTIES

- A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of Project Manual.
  - 1. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

## **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 neither planted nor 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 Standard 1992-01. Provide written report on completion of cleaning.
  - p. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.
  - q. Leave Project clean and ready for occupancy.
- C. Construction Waste Disposal: Comply with waste disposal requirements in Section 01 50 00 - 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

### CLOSEOUT PROCEDURES

**SECTION 01 78 23**  
**OPERATION AND MAINTENANCE DATA**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation and maintenance documentation directory.
  - 2. Emergency procedures manuals.
  - 3. Operation manuals for systems, subsystems, and equipment.
  - 4. Product maintenance manuals.
  - 5. Systems and equipment maintenance manuals.

**1.2 RELATED REQUIREMENTS**

- A. Section 01 33 00 - Submittal Procedures for submitting copies of submittals for operation and maintenance manuals.

**1.3 DEFINITIONS**

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

**1.4 CLOSEOUT SUBMITTALS**

- A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.
  - 1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
  - 2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.
- B. Format: Submit operations and maintenance manuals in the following format:
  - 1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.
    - a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
    - b. Enable inserted reviewer comments on draft submittals.

- C. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.
- D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.
  - 1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

## 1.5 COORDINATION

- A. Where operation and maintenance documentation include information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.

# PART 2 PRODUCTS

## 2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

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

## 2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:



1. Title page.
  2. Table of contents.
  3. Manual contents.
- B. Title Page: Include the following information:
1. Subject matter included in manual.
  2. Name and address of Project.
  3. Name and address of Owner.
  4. Date of submittal.
  5. Name and contact information for Contractor.
  6. Name and contact information for Construction Manager.
  7. Name and contact information for Architect.
  8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
  9. Cross-reference to related systems in other operation and maintenance manuals.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
- E. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
  2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.
- 2.3 EMERGENCY PROCEDURES MANUALS
- A. Content: Organize manual into a separate section for each of the following:
1. Type of emergency.
  2. Emergency instructions.
  3. Emergency procedures.
- B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
1. Fire.

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

## 2.4 OPERATION AND MAINTENANCE MANUALS

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

4. Regulation and control procedures.
  5. Instructions on stopping.
  6. Normal shutdown instructions.
  7. Seasonal and weekend operating instructions.
  8. Required sequences for electric or electronic systems.
  9. Special operating instructions and procedures.
- D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
- E. Piped Systems: Diagram piping as installed and identify color-coding where required for identification.

## 2.5 PRODUCT MAINTENANCE MANUALS

- A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.
- B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual and drawing or schedule designation or identifier where applicable.
- C. Product Information: Include the following, as applicable:
1. Product name and model number.
  2. Manufacturer's name.
  3. Color, pattern, and texture.
  4. Material and chemical composition.
  5. Reordering information for specially manufactured products.
- D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
1. Inspection procedures.
  2. Types of cleaning agents to be used and methods of cleaning.
  3. List of cleaning agents and methods of cleaning detrimental to product.
  4. Schedule for routine cleaning and maintenance.
  5. Repair instructions.
- E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
- F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

## 2.6 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

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

OAKTON COLLEGE  
ADJACENCIES RENOVATIONS – PHASE 2A  
ISSUED FOR PERMIT

Perkins&Will  
021075.000  
21 NOVEMBER 2025

**PART 3 EXECUTION (NOT USED)**

**END OF SECTION**

**SECTION 01 78 39**  
**PROJECT RECORD DOCUMENTS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Administrative and procedural requirements for project record documents, including the following:
  - 1. Record Drawings.
  - 2. Record Digital Data Files.
  - 3. Record Specifications.
  - 4. Record Product Data.
  - 5. Miscellaneous record submittals.

**1.2 RELATED REQUIREMENTS**

- A. Section 01 77 00 - Closeout Procedures for general closeout procedures.
- B. Section 01 78 23 - Operation and Maintenance Data for operation and maintenance manual requirements.
- C. Divisions 02 through 49 Sections for specific requirements for Project Record Documents of the Work in those Sections.

**1.3 CLOSEOUT SUBMITTALS**

- A. Record Drawings: Comply with the following:
  - 1. Initial Submittal:
    - a. Submit PDF electronic files of Contractor's paper-copy set(s) of marked-up record prints.
    - b. Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
  - 2. Final Submittal:
    - a. Submit PDF electronic files of scanned record prints.
    - b. Print each drawing, whether or not changes and additional information were recorded.
  - 3. Final Submittal:
    - a. Submit record digital data files.
    - b. Plot each drawing file, whether or not changes and additional information were recorded.
- B. Record Model: Comply with Owner's requirements.
- C. Record Specifications: Submit annotated PDF electronic files of Project's Specifications, including addenda and contract modifications.

- D. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.
  - 1. Where record Product Data are required as part of operation and maintenance manuals, submit duplicate marked-up Product Data as a component of manual.
- E. Miscellaneous Record Submittals: See other Specification Sections for miscellaneous record-keeping requirements and submittals in connection with various construction activities. Submit annotated PDF electronic files and directories of each submittal.

## **PART 2 PRODUCTS**

### **2.1 RECORD DRAWINGS**

- A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised drawings as modifications are issued.
  - 1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
    - a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
    - b. Accurately record information in an acceptable drawing technique.
    - c. Record data as soon as possible after obtaining it.
    - d. Record and check the markup before enclosing concealed installations.
    - e. Cross-reference record prints to corresponding archive photographic documentation.
  - 2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations below first floor.
    - d. Locations and depths of underground utilities.
    - e. Revisions to routing of piping and conduits.
    - f. Revisions to electrical circuitry.
    - g. Actual equipment locations.
    - h. Duct size and routing.
    - i. Locations of concealed internal utilities.
    - j. Changes made by Change Order or Construction Change Directive.
    - k. Changes made following Architect's written orders.
    - l. Details not on the original Contract Drawings.
    - m. Field records for variable and concealed conditions.
    - n. Record information on the Work that is shown only schematically.
  - 3. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.
  - 4. Mark record sets in red. Use other colors to distinguish between changes for different categories of the Work at same location.

5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

## 2.2 RECORD DIGITAL DATA FILES

- A. Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:
  1. Format: Same digital data software program, version, and operating system as the original Contract Drawings.
  2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.
  3. Refer instances of uncertainty to Architect for resolution.
  4. Architect will furnish Contractor with digital data files of the original Contract Drawings for use in recording information.
    - a. Architect makes no representations as to the accuracy or completeness of Electronic Drawings as they relate to the Contract Drawings.
    - b. Digital Data Software Program: The electronic files will be made available in the digital data software program in which they were produced by the Architect. Contractor is responsible for any necessary conversions to an alternate software program.
    - c. See Section 01 33 00 - Submittal Procedures and "Electronic File Transfer Agreement" form for requirements related to use of Architect's digital data files.
- B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing record Drawings where neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
  1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
  2. Integrate newly prepared record Drawings into record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
- C. Format: Identify and date each record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location
  1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  2. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.
  3. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Architect.
    - e. Name of Contractor.



## 2.3 RECORD SPECIFICATIONS

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

## 2.4 RECORD PRODUCT DATA

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

## 2.5 MISCELLANEOUS RECORD SUBMITTALS

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

### **PART 3 EXECUTION**

#### **3.1 RECORDING AND MAINTENANCE**

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

### **END OF SECTION**

## **SECTION 01 79 00**

### **DEMONSTRATION AND TRAINING**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Administrative and procedural requirements for instructing Owner's personnel, including the following:
  - 1. Instruction in operation and maintenance of systems, subsystems, and equipment.
  - 2. Demonstration and training video recordings.
  - 3. Descriptions and responsibilities for commissioning demonstration and training requirements.

##### **1.2 SUBMITTALS**

- A. Informational Submittals:
  - 1. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
    - a. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products.
  - 2. Attendance Record: For each training module, submit list of participants.
- B. Closeout Submittals:
  - 1. Demonstration and Training Video Recordings: Submit within seven days of end of each training module.
    - a. At completion of training, submit complete training manual(s) for Owner's use prepared in same PDF file format required for operation and maintenance manuals specified in Section 01 78 23 - Operation and Maintenance Data.

##### **1.3 COORDINATION**

- A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.
- B. Coordinate instructors, including providing notification of dates, times, length of instruction time, and course content.

- C. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data have been reviewed and approved by Architect and Owner.

#### 1.4 INSTRUCTION PROGRAM

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

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

#### 1.5 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 78 23 - Operation and Maintenance Data.
- B. Set up instructional equipment at instruction location.

#### 1.6 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  - 1. Owner will furnish Contractor with names and positions of participants.

- C. Scheduling: Provide instruction at mutually agreed-on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
    - 1. Schedule training with Owner with at least 10 days' advance notice.
  - D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
  - E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.
  - F. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.
- 1.7 DEMONSTRATION AND TRAINING VIDEO RECORDINGS
- A. General: Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
  - B. Digital Video Recordings:
    - 1. Submit video recording by method acceptable to Owner.
    - 2. File Hierarchy: Organize folder structure and file locations according to Project Manual table of contents. Provide complete screen-based menu.
    - 3. File Names: Utilize file names based on name of equipment generally described in video segment, as identified in Project specifications.

**END OF SECTION**

## **SECTION 01 91 13**

### **GENERAL COMMISSIONING REQUIREMENTS**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. General requirements that apply to implementation of commissioning without regard to systems, subsystems, and equipment being commissioned.

##### **1.2 DEFINITIONS**

- A. BoD: Basis of Design.
- B. CxA: Commissioning Authority.
- C. OPR: Owner's Project Requirements.
- D. Systems, Subsystems, and Equipment: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, and equipment.
- E. TAB: Testing, Adjusting, and Balancing.

##### **1.3 COMMISSIONING TEAM**

- A. Members Appointed by Contractor(s): Individuals, each having authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated actions. The commissioning team shall consist of, but not be limited to, representatives of Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.
- B. Members Appointed by Owner:
  - 1. CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process. Owner will engage the CxA under a separate contract.
  - 2. Representatives of the facility user and operation and maintenance personnel.
  - 3. Architect and engineering design professionals.

##### **1.4 OWNER'S RESPONSIBILITIES**

- A. Provide the OPR documentation to the CxA and Contractor for use in developing the commissioning plan; systems manual; operation and maintenance training plan; and testing plans and checklists.
- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities including, but not limited to, the following:
  - 1. Coordination meetings.
  - 2. Training in operation and maintenance of systems, subsystems, and equipment.

3. Testing meetings.
  4. Demonstration of operation of systems, subsystems, and equipment.
- C. Provide utility services required for the commissioning process.
- D. Provide the BoD documents, prepared by Architect and approved by Owner, to the CxA and Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

#### 1.5 CONTRACTOR'S RESPONSIBILITIES

- A. Provide utility services required for the commissioning process.
- B. Contractor shall assign representatives with expertise and authority to act on behalf of the Contractor and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
1. Participate in design- and construction-phase coordination meetings.
  2. Participate in maintenance orientation and inspection.
  3. Participate in operation and maintenance training sessions.
  4. Participate in final review at acceptance meeting.
  5. Certify that Work is complete and systems are operational according to the Contract Documents, including calibration of instrumentation and controls.
  6. Evaluate performance deficiencies identified in test reports and, in collaboration with entity responsible for system and equipment installation, recommend corrective action.
  7. Review and approve final commissioning documentation.
- C. Subcontractors shall assign representatives with expertise and authority to act on behalf of subcontractors and schedule them to participate in and perform commissioning team activities including, but not limited to, the following:
1. Participate in design- and construction-phase coordination meetings.
  2. Participate in maintenance orientation and inspection.
  3. Participate in procedures meeting for testing.
  4. Participate in final review at acceptance meeting.
  5. Provide schedule for operation and maintenance data submittals, equipment startup, and testing to CxA for incorporation into the commissioning plan. Update schedule on a weekly basis throughout the construction period.
  6. Provide information to the CxA for developing construction-phase commissioning plan.
  7. Participate in training sessions for Owner's operation and maintenance personnel.
  8. Provide updated Project Record Documents to the CxA on a daily basis.
  9. Gather and submit operation and maintenance data for systems, subsystems, and equipment to the CxA, as specified in Division 01 Section "Operation and Maintenance Data."
  10. Provide technicians who are familiar with the construction and operation of installed systems and who shall develop specific test procedures and participate in testing of installed systems, subsystems, and equipment.

#### 1.6 CXA'S RESPONSIBILITIES

- A. Organize and lead the commissioning team.

### GENERAL COMMISSIONING REQUIREMENTS



- B. Prepare a construction-phase commissioning plan. Collaborate with Contractor and with subcontractors to develop test and inspection procedures. Include design changes and scheduled commissioning activities coordinated with overall Project schedule. Identify commissioning team member responsibilities, by name, firm, and trade specialty, for performance of each commissioning task.
- C. Review and comment on submittals from Contractor for compliance with the OPR, BoD, Contract Documents, and construction-phase commissioning plan. Review and comment on performance expectations of systems and equipment and interfaces between systems relating to the OPR and BoD.
- D. Convene commissioning team meetings for the purpose of coordination, communication, and conflict resolution; discuss progress of the commissioning processes. Responsibilities include arranging for facilities, preparing agenda and attendance lists, and notifying participants. The CxA shall prepare and distribute minutes to commissioning team members and attendees within five workdays of the commissioning meeting.
- E. At the beginning of the construction phase, conduct an initial construction-phase coordination meeting for the purpose of reviewing the commissioning activities and establishing tentative schedules for operation and maintenance submittals; operation and maintenance training sessions; TAB Work; and Project completion.
- F. Observe and inspect construction and report progress and deficiencies. In addition to compliance with the OPR, BoD, and Contract Documents, inspect systems and equipment installation for adequate accessibility for maintenance and component replacement or repair.
- G. Prepare Project-specific test and inspection procedures and checklists.
- H. Schedule, direct, witness, and document tests, inspections, and systems startup.
- I. Compile test data, inspection reports, and certificates and include them in the systems manual and commissioning report.
- J. Certify date of acceptance and startup for each item of equipment for start of warranty periods.
- K. Review Project Record Documents for accuracy. Request revisions from Contractor to achieve accuracy. Project Record Documents requirements are specified in Section 01 78 39 - Project Record Documents.
- L. Review and comment on operation and maintenance documentation and systems manual outline for compliance with the OPR, BoD, and Contract Documents. Operation and maintenance documentation requirements are specified in Section 01 78 23 - Operation and Maintenance Data.
- M. Prepare operation and maintenance training program and provide qualified instructors to conduct operation and maintenance training. Operation and maintenance training is specified in Section 01 79 00 - Demonstration and Training
- N. Videotape and edit training sessions.
- O. Videotape construction progress including hidden shafts.
- P. Prepare commissioning reports.

#### GENERAL COMMISSIONING REQUIREMENTS

- Q. Assemble the final commissioning documentation, including the commissioning report and Project Record Documents.

#### 1.7 COMMISSIONING DOCUMENTATION

- A. Index of Commissioning Documents: CxA shall prepare an index to include storage location of each document.
- B. OPR: A written document, prepared by Owner, that details the functional requirements of Project and expectations of how it will be used and operated. This document includes Project and design goals, measurable performance criteria, budgets, schedules, success criteria, and supporting information.
- C. BoD Document: A document, prepared by Architect, that records concepts, calculations, decisions, and product selections used to meet the OPR and to satisfy applicable regulatory requirements, standards, and guidelines. The document includes both narrative descriptions and lists of individual items that support the design process.
- D. Commissioning Plan: A document, prepared by CxA, that outlines the schedule, allocation of resources, and documentation requirements of the commissioning process, and shall include, but is not limited to the following:
1. Plan for delivery and review of submittals, systems manuals, and other documents and reports. Identification of the relationship of these documents to other functions and a detailed description of submittals that are required to support the commissioning processes. Submittal dates shall include the latest date approved submittals must be received without adversely affecting commissioning plan.
  2. Description of the organization, layout, and content of commissioning documentation (including systems manual) and a detailed description of documents to be provided along with identification of responsible parties.
  3. Identification of systems and equipment to be commissioned.
  4. Description of schedules for testing procedures along with identification of parties involved in performing and verifying tests.
  5. Identification of items that must be completed before the next operation can proceed.
  6. Description of responsibilities of commissioning team members.
  7. Description of observations to be made.
  8. Description of requirements for operation and maintenance training, including required training materials.
  9. Description of expected performance for systems, subsystems, equipment, and controls.
  10. Schedule for commissioning activities with specific dates coordinated with overall construction schedule.
  11. Identification of installed systems, subsystems, and equipment, including design changes that occurred during the construction phase.
  12. Process and schedule for documenting changes on a continuous basis to appear in Project Record Documents.
  13. Process and schedule for completing prestart and startup checklists for systems, subsystems, and equipment to be verified and tested.

14. Step-by-step procedures for testing systems, subsystems, and equipment with descriptions for methods of verifying relevant data, recording the results obtained, and listing parties involved in performing and verifying tests.
- E. Test Checklists: CxA shall develop test checklists for each system, subsystem, or equipment including interfaces and interlocks, and include a separate entry, with space for comments, for each item to be tested. Prepare separate checklists for each mode of operation and provide space to indicate whether the mode under test responded as required. Provide space for testing personnel to sign off on each checklist. Specific checklist content requirements are specified in Division 23 Section "HVAC Commissioning Requirements." Each checklist, regardless of system, subsystem, or equipment being tested, shall include, but not be limited to, the following:
  1. Name and identification code of tested item.
  2. Test number.
  3. Time and date of test.
  4. Indication of whether the record is for a first test or retest following correction of a problem or issue.
  5. Dated signatures of the person performing test and of the witness, if applicable.
  6. Individuals present for test.
  7. Deficiencies.
  8. Issue number, if any, generated as the result of test.
- F. Certificate of Readiness: Certificate of Readiness shall be signed by Contractor, Subcontractor(s), Installer(s), and CxA certifying that systems, subsystems, equipment, and associated controls are ready for testing. Completed test checklists signed by the responsible parties shall accompany this certificate.
- G. Test and Inspection Reports: CxA shall record test data, observations, and measurements on test checklists. Photographs, forms, and other means appropriate for the application shall be included with data. CxA shall compile test and inspection reports and test and inspection certificates and include them in systems manual and commissioning report.
- H. Corrective Action Documents: CxA shall document corrective action taken for systems and equipment that fail tests. Include required modifications to systems and equipment and revisions to test procedures, if any. Retest systems and equipment requiring corrective action and document retest results.
- I. Issues Log: CxA shall prepare and maintain an issues log that describes design, installation, and performance issues that are at variance with the OPR, BoD, and Contract Documents. Identify and track issues as they are encountered, documenting the status of unresolved and resolved issues.
  1. Creating an Issues Log Entry:
    - a. Identify the issue with unique numeric or alphanumeric identifier by which the issue may be tracked.
    - b. Assign a descriptive title of the issue.
    - c. Identify date and time of the issue.
    - d. Identify test number of test being performed at the time of the observation, if applicable, for cross-reference.
    - e. Identify system, subsystem, and equipment to which the issue applies.
    - f. Identify location of system, subsystem, and equipment.

- g. Include information that may be helpful in diagnosing or evaluating the issue.
    - h. Note recommended corrective action.
    - i. Identify commissioning team member responsible for corrective action.
    - j. Identify expected date of correction.
    - k. Identify person documenting the issue.
  - 2. Documenting Issue Resolution:
    - a. Log date correction is completed or the issue is resolved.
    - b. Describe corrective action or resolution taken. Include description of diagnostic steps taken to determine root cause of the issue, if any.
    - c. Identify changes to the OPR, BoD, or Contract Documents that may require action.
    - d. State that correction was completed and system, subsystem, and equipment is ready for retest, if applicable.
    - e. Identify person(s) who corrected or resolved the issue.
    - f. Identify person(s) documenting the issue resolution.
  - 3. Issues Log Report: On a periodic basis, but not less than for each commissioning team meeting, CxA shall prepare a written narrative for review of outstanding issues and a status update of the issues log. As a minimum, CxA shall include the following information in the issues log and expand it in the narrative:
    - a. Issue number and title.
    - b. Date of the identification of the issue.
    - c. Name of the commissioning team member assigned responsibility for resolution.
    - d. Expected date of correction.
- J. Commissioning Report: CxA shall document results of the commissioning process including unresolved issues and performance of systems, subsystems, and equipment. The commissioning report shall indicate whether systems, subsystems, and equipment have been completed and are performing according to the OPR, BoD, and Contract Documents. The commissioning report shall include, but is not limited to, the following:
  - 1. Lists and explanations of substitutions; compromises; variances in the OPR, BoD, and Contract Documents; record of conditions; and, if appropriate, recommendations for resolution. This report shall be used to evaluate systems, subsystems, and equipment and shall serve as a future reference document during Owner occupancy and operation. It shall describe components and performance that exceed requirements of the OPR, BoD, and Contract Documents and those that do not meet requirements of the OPR, BoD, and Contract Documents. It may also include a recommendation for accepting or rejecting systems, subsystems, and equipment.
  - 2. OPR and BoD documentation.
  - 3. Commissioning plan.
  - 4. Testing plans and reports.
  - 5. Corrective modification documentation.
  - 6. Issues log.
  - 7. Completed test checklists.
  - 8. Listing of off-season test(s) not performed and a schedule for their completion.
- K. Systems Manual: CxA shall gather required information and compile systems manual. Systems manual shall include, but is not limited to, the following:

#### GENERAL COMMISSIONING REQUIREMENTS

1. OPR and BoD, including system narratives, schematics, and changes made throughout the Project.
2. Project Record Documents as specified in Section 01 78 39 - Project Record Documents.
3. Final commissioning plan.
4. Commissioning report.
5. Operation and maintenance data as specified in Section 01 78 23 - Operation and Maintenance Data.

#### 1.8 SUBMITTALS

- A. Commissioning Plan Prefinal Submittal: CxA shall submit three hard copies of prefinal commissioning plan. Deliver one copy to Contractor, one to Owner, and one to Architect. Present submittal in sufficient detail to evaluate data collection and arrangement process. One copy, with review comments, will be returned to the CxA for preparation of the final construction-phase commissioning plan.
- B. Commissioning Plan Final Submittal: CxA shall submit three hard copies and two sets of electronically formatted information of final commissioning plan. Deliver one hard copy and one set of discs to Owner, and two copies to Architect. The final submittal must address previous review comments. The final submittal shall include a copy of the prefinal submittal review comments along with a response to each item.
- C. Test Checklists and Report Forms: CxA shall submit sample checklists and forms to Contractor quality-control manager and subcontractors for review and comment. Submit three copies of each checklist and report form.
- D. Certificates of Readiness: CxA shall submit Certificates of Readiness.
- E. Test and Inspection Reports: CxA shall submit test and inspection reports.
- F. Corrective Action Documents: CxA shall submit corrective action documents.
- G. Prefinal Commissioning Report Submittal: CxA shall submit two hard copies of the prefinal commissioning report. Include a copy of the preliminary submittal review comments along with CxA's response to each item. CxA shall deliver one copy to Owner and one copy to Architect. One copy, with review comments, will be returned to the CxA for preparation of final submittal.
- H. Final Commissioning Report Submittal: CxA shall submit two hard copies and two sets of electronically formatted information of the final commissioning report. CxA shall deliver one hard copy and one set of discs to Owner, and one copy to Architect. The final submittal must address previous review comments and shall include a copy of the prefinal submittal review comments along with a response to each item.

#### 1.9 QUALITY ASSURANCE

- A. Instructor Qualifications: Factory-authorized service representatives, experienced in training, operation, and maintenance procedures for installed systems, subsystems, and equipment.

- B. Test Equipment Calibration: Comply with test equipment manufacturer's calibration procedures and intervals. Recalibrate test instruments immediately whenever instruments have been repaired following damage or dropping. Affix calibration tags to test instruments. Instruments shall have been calibrated within six months prior to use.

#### 1.10 COORDINATION

- A. Coordinating Meetings: CxA shall conduct biweekly coordination meetings of the commissioning team to review progress on the commissioning plan, to discuss scheduling conflicts, and to discuss upcoming commissioning process activities.
- B. Pretesting Meetings: CxA shall conduct pretest meetings of the commissioning team to review startup reports, pretest inspection results, testing procedures, testing personnel and instrumentation requirements, and manufacturers' authorized service representative services for each system, subsystem, equipment, and component to be tested.
- C. Testing Coordination: CxA shall coordinate sequence of testing activities to accommodate required quality-assurance and -control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.
- D. Manufacturers' Field Services: CxA shall coordinate services of manufacturers' field services.

### **PART 2 PRODUCTS (NOT USED)**

### **PART 3 EXECUTION**

#### 3.1 OPERATION AND MAINTENANCE TRAINING REQUIREMENTS

- A. Training Preparation Conference: Before operation and maintenance training, CxA shall convene a training preparation conference to include Owner's operation and maintenance personnel, Contractor, and subcontractors. In addition to requirements specified in Section 01 79 00 - Demonstration and Training, perform the following:
  - 1. Review the OPR and BoD.
  - 2. Review installed systems, subsystems, and equipment.
  - 3. Review instructor qualifications.
  - 4. Review instructional methods and procedures.
  - 5. Review training module outlines and contents.
  - 6. Review course materials (including operation and maintenance manuals).
  - 7. Inspect and discuss locations and other facilities required for instruction.
  - 8. Review and finalize training schedule and verify availability of educational materials, instructors, audiovisual equipment, and facilities needed to avoid delays.
  - 9. For instruction that must occur outside, review weather and forecasted weather conditions and procedures to follow if conditions are unfavorable.

#### GENERAL COMMISSIONING REQUIREMENTS

- B. Training Modules: Develop an instruction program that includes individual training modules for each system, subsystem, and equipment as specified in Section 01 79 00 - Demonstration and Training.

**END OF SECTION**

**SECTION 02 41 19**  
**SELECTIVE DEMOLITION**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Demolition and removal of selected portions of building or structure.

**1.2 RELATED REQUIREMENTS**

- A. Section 01 10 00 - Summary for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
- B. Section 01 73 00 - Execution for cutting and patching procedures.
- C. Section 01 74 19 - Construction Waste Management and Disposal for disposal of demolished materials.

**1.3 DEFINITIONS**

- A. Remove: Detach items from existing construction and dispose of them off-site unless indicated to be salvaged or reinstalled.

**1.4 MATERIALS OWNERSHIP**

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

**1.5 PREINSTALLATION MEETINGS**

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

**1.6 SUBMITTALS**

- A. Informational Submittals:
  - 1. Qualification Data: For refrigerant recovery technician.
  - 2. Engineering Survey: Submit engineering survey of condition of building.



3. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property for environmental protection, dust control, and noise control. Indicate proposed locations and construction of barriers.
4. Schedule of Selective Demolition Activities: Indicate the following:
  - a. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's, building manager's, and other tenants' on-site operations are uninterrupted.
  - b. Interruption of utility services. Indicate how long utility services will be interrupted.
  - c. Coordination for shutoff, capping, and continuation of utility services.
  - d. Use of elevator and stairs.
  - e. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
5. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 01 32 33 - Photographic Documentation. Submit before Work begins.
6. Landfill Records: Indicate receipt and acceptance of hazardous wastes by a landfill facility licensed to accept hazardous wastes.
7. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
8. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

B. Closeout Submittals:

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

1.7 QUALITY ASSURANCE

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

1.8 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.

1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
  - E. Storage or sale of removed items or materials on-site is not permitted.
  - F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
    1. Maintain fire-protection facilities in service during selective demolition operations.
- 1.9 WARRANTY
- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding.
  - 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 to not 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. Engage a professional engineer to 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.

- D. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- E. Verify that hazardous materials have been remediated before proceeding with building demolition operations.
- F. Survey of Existing Conditions: Record existing conditions by use of measured drawings, preconstruction photographs or video, and templates.
  - 1. Comply with requirements specified in Section 01 32 33 - Photographic Documentation.
  - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
  - 3. 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 PREPARATION

- A. Refrigerant: Before starting demolition, remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction.

### 3.3 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. Notify the Architect immediately if the removal of fire-suppression, plumbing HVAC, electrical, communications, and safety and security systems or components will adversely affect the operation of those systems outside the limits of demolition.
  - 3. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
  - 4. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
    - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
    - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
    - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
    - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.

### SELECTIVE DEMOLITION

- 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.

### 3.4 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 01 50 00 - 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.

### 3.5 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 4 hours after flame-cutting operations.

### SELECTIVE DEMOLITION

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. Comply with requirements in Section 01 74 19 - Construction Waste Management and Disposal.
- 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. 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.

### 3.6 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. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- D. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings." Do not use methods requiring solvent-based adhesive strippers.

### 3.7 DISPOSAL OF DEMOLISHED MATERIALS

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

3.8 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**

**SECTION 03 33 00**

**ARCHITECTURAL CAST-IN-PLACE CONCRETE**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Requirements for cast-in-place architectural concrete including reinforcement accessories, concrete materials, concrete mixture design, vapor barrier, placement procedures, and finishes.

**1.2 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete for formwork; material, fabrication, and installation requirements for steel reinforcement; and field quality control.
- B. Section 07 92 00 - Joint Sealants for elastomeric joint sealants in contraction and other joints in cast-in-place architectural concrete.

**1.3 DEFINITIONS**

- A. Architectural Cast-in-Place Concrete: Formed concrete that is exposed to view on surfaces of completed structure or building and that requires special concrete materials, formwork, placement, or finishes to obtain specified architectural appearance.
- B. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.
- C. Design Reference Sample: Sample designated by Architect in the Contract Documents that reflects acceptable surface quality and appearance of cast-in-place architectural concrete.
- D. Reveal: Projection of coarse aggregate from matrix or mortar after completion of exposure operations.

**1.4 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data: For each type of product indicated.
- B. Informational Submittals:
  - 1. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
    - a. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali-aggregate reactivity.

2. Material Certificates: For each of the following, signed by manufacturer:
  - a. Cementitious materials.
  - b. Admixtures.
  - c. Form materials and form-release agents.
  - d. Repair materials.
3. Minutes of preinstallation conference.

#### 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C94/C94M requirements for production facilities and equipment.
  1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- B. Testing Agency Qualifications: An independent agency qualified according to ASTM C1077 and ASTM E329 for testing indicated, as documented according to ASTM E 548.
  1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
  2. Personnel performing laboratory tests shall be an ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- C. Source Limitations for Cast-in-Place Architectural Concrete: Obtain each color, size, type, and variety of concrete material and concrete mixture from one manufacturer with resources to provide cast-in-place architectural concrete of consistent quality in appearance and physical properties.
- D. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
  1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5 and Section 6, "Architectural Concrete."
  2. ACI 303.1, "Specification for Cast-in-Place Architectural Concrete."
- E. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- F. Field Sample Panels: After approval of verification sample and before casting architectural concrete, produce field sample panels to demonstrate the approved range of selections made under sample submittals. Produce a minimum of 3 sets of full-scale panels, cast vertically, approximately 48 by 48 by 6 inches (1200 by 1200 by 150 mm) minimum, to demonstrate the expected range of finish, color, and texture variations.
  1. Locate panels as indicated or, if not indicated, as directed by Architect.
  2. Demonstrate methods of curing, aggregate exposure, sealers, and coatings, as applicable.



3. In presence of Architect, damage part of an exposed-face surface for each finish, color, and texture, and demonstrate materials and techniques proposed for repair of tie holes and surface blemishes to match adjacent undamaged surfaces.
  4. Maintain field sample panels during construction in an undisturbed condition as a standard for judging the completed Work.
  5. Demolish and remove field sample panels when directed.
- G. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."
1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place architectural concrete to attend, including the following:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete manufacturer.
    - d. Cast-in-place architectural concrete subcontractor.
  2. Review concrete finishes and finishing, curing procedures, construction joints, forms and form-removal limitations, reinforcement accessory installation, concrete repair procedures, and protection of cast-in-place architectural concrete.

## **PART 2 PRODUCTS**

### **2.1 STEEL REINFORCEMENT AND ACCESSORIES**

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded-wire fabric in place; manufacture according to CRSI's "Manual of Standard Practice."
1. Where legs of wire bar supports contact forms, use gray, all-plastic, CRSI Class 1, gray, plastic-protected, or CRSI Class 2, stainless-steel bar supports.

### **2.2 CONCRETE MATERIALS**

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
1. Portland Cement: ASTM C 150, Type I, gray. Supplement with the following:
    - a. Fly Ash: ASTM C 618, Class C.
    - b. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag cement.
- B. Normal-Weight Aggregates: ASTM C 33, Class 5S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
1. Maximum Coarse Aggregate Size: 1 inch (25 mm).
  2. Gradation: Uniformly graded.

- C. Normal-Weight Fine Aggregate: ASTM C33/C33M or ASTM C144, manufactured or natural sand, from same source for entire Project.
- D. Water: Potable, complying with ASTM C94/C94M except free of wash water from mixer washout operations.

## 2.3 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C260/C260M.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  - 1. Water-Reducing Admixture: ASTM C494/C494M, Type A.
  - 2. Retarding Admixture: ASTM C494/C494M, Type B.
  - 3. Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type D.
  - 4. High-Range, Water-Reducing Admixture: ASTM C494/C494M, Type F.
  - 5. High-Range, Water-Reducing and Retarding Admixture: ASTM C494/C494M, Type G.
  - 6. Plasticizing and Retarding Admixture: ASTM C1017/C1017M, Type II.
- C. Color Pigment: ASTM C979/C979M, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.
  - 1. Color: As indicated by manufacturer's designation.

## 2.4 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- B. Moisture-Retaining Cover: ASTM C171, polyethylene film or white burlap-polyethylene sheet.
- C. Waterborne, Membrane-Forming Curing Compound: ASTM C309, Type 1, Class B.
  - 1. For integrally colored concrete, curing compound shall be pigmented type approved by color pigment manufacturer.
  - 2. For concrete indicated to be sealed, curing compound shall be compatible with sealer.

## 2.5 REPAIR MATERIALS

- A. Bonding Agent: ASTM C 1059, Type II, nonredispersible, acrylic emulsion or styrene butadiene.
- B. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements.
  - 1. Types I and II, non-load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.

## 2.6 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of cast-in-place architectural concrete proportioned on basis of laboratory trial mixture or field test data, or both, according to ACI 301.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed design mixtures based on laboratory trial mixtures.
- B. Proportion concrete mixtures as follows:
  - 1. Compressive Strength (28 Days): 5000 psi (34.5 MPa).
  - 2. Maximum Water-Cementitious Materials Ratio: 0.46.
  - 3. Slump Limit: 3 inches (75 mm), plus or minus 1 inch (25 mm).
  - 4. Air Content: 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.
  - 5. Air Content: 6 percent, plus or minus 1.5 percent at point of delivery for 1-inch (25-mm) nominal maximum aggregate size.
- C. Cementitious Materials: For cast-in-place architectural concrete exposed to deicers, limit percentage, by weight, of cementitious materials other than portland cement according to ACI 301 requirements.
- D. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- E. Admixtures: Use admixtures according to manufacturer's written instructions.
- F. Color Pigment: Add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

## 2.7 CONCRETE MIXING

- A. Ready-Mixed or Site-Mixed Architectural Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and furnish batch ticket information.
  - 1. Clean equipment used to mix and deliver cast-in-place architectural concrete to prevent contamination from other concrete.
  - 2. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## 2.8 VAPOR BARRIER

- A. Sheet Vapor Barrier:
  - 1. Type: 15 mil polyolefin film meeting requirements of ASTM E1745, Class A.
  - 2. Water Vapor Transmittance (After mandatory condition per ASTM E154/E154M sections 8,11,12,13): Maximum perm rating of 0.01 as tested in accordance with ASTM E1745 Section 7.
  - 3. Strength: ASTM E1745: Class A.
  - 4. Products:
    - a. Meadows, W. R., Inc.; Perminator HP 15 mil.
    - b. Reef Industries, Inc.; Griffolyn 15 mil Green.
    - c. Stego Industries, LLC; Stego Wrap 15 mil Class A.

- B. Accessories:
1. Bonding Agent: Manufacturer's approved or recommended vapor barrier bonding agent.
  2. Sealing and Seaming Tape: High density polyethylene tape compatible with vapor barrier membrane, and manufactured by or recommended by vapor barrier membrane manufacturer. Tape for joints shall have at least the same permeability rating as the vapor barrier specified.
  3. Vapor Proofing Mastic: Manufacturer's approved or recommended vapor proofing mastic with the same permeability rating as the vapor barrier specified.
  4. Pipe Boot: Construct pipe boots from vapor barrier material and pressure sensitive tape in accordance with manufacturer's instructions.

### **PART 3 EXECUTION**

#### **3.1 FORMWORK**

- A. Limit deflection of form-facing panels to not exceed ACI 303.1 requirements.
- B. In addition to ACI 303.1 limits on form-facing panel deflection, limit cast-in-place architectural concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
1. Class A, 1/8 inch (3.2 mm).
- C. Fabricate forms to result in cast-in-place architectural concrete that complies with ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
1. In addition to ACI 117, comply with the following tolerances:
- D. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast-in-place surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical. Kerf wood rustications, keyways, reglets, recesses, and the like, for easy removal.
1. Seal form joints and penetrations at form ties with form joint tape or form joint sealant to prevent cement paste leakage.
  2. Do not use rust-stained steel form-facing material.
- E. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- F. Chamfer exterior corners and edges of cast-in-place architectural concrete.
- G. Coat contact surfaces of wood rustications and chamfer strips with sealer before placing reinforcement, anchoring devices, and embedded items.
- H. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- I. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.

- J. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- K. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
- L. Coat contact surfaces of forms with surface retarder, according to manufacturer's written instructions, before placing reinforcement.
- M. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and attach securely to prevent deflection and maintain stability of liners during concreting. Prevent form liners from sagging and stretching in hot weather. Seal joints of form liners and form liner accessories to prevent mortar leaks. Coat form liner with form-release agent.

### 3.2 REINFORCEMENT AND INSERTS

- A. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

### 3.3 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, form-release agent, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
  - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously between construction joints. Deposit concrete to avoid segregation.
  - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 303.1.
  - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. Do not permit vibrators to contact forms.

### 3.4 FINISHES, GENERAL

- A. Architectural Concrete Finish: Match Architect's design reference sample, identified and described as indicated, to satisfaction of Architect.
- B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces.

1. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.
- C. Maintain uniformity of special finishes over construction joints, unless otherwise indicated.

### 3.5 EXPOSED-AGGREGATE FINISHES

- A. Scrubbed Finish: After concrete has achieved a compressive strength of from 1000 to 1500 psi (6.9 to 10.3 MPa), apply scrubbed finish. Wet concrete surfaces thoroughly and scrub with stiff fiber or wire brushes, using water freely, until top mortar surface is removed and aggregate is uniformly exposed. Rinse scrubbed surfaces with clean water. Maintain continuity of finish on each surface or area of Work. Remove only enough concrete mortar from surfaces to match design reference sample or mockup.
- B. High-Pressure Water-Jet Finish: Perform high-pressure water jetting on concrete that has achieved a minimum compressive strength of 4500 psi (31 MPa). Coordinate with formwork removal to ensure that surfaces to be high-pressure water-jet finished are treated at same age for uniform results.
  1. Surface Continuity: Perform high-pressure water-jet finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances in reveal projection to match design reference sample or mockup.
- C. Abrasive-Blast Finish: Perform abrasive blasting after compressive strength of concrete exceeds 2000 psi (13.8 MPa). Coordinate with formwork removal to ensure that surfaces to be abrasive blasted are treated at same age for uniform results.
  1. Surface Continuity: Perform abrasive-blast finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances in depths of blast to match design reference sample or mockup.
  2. Abrasive Blasting: Abrasive blast corners and edges of patterns carefully, using backup boards, to maintain uniform corner or edge line. Determine type of nozzle, nozzle pressure, and blasting techniques required to match design reference sample or mockup.
  3. Depth of Cut: Use an abrasive grit of proper type and gradation to expose aggregate and surrounding matrix surfaces to match design reference sample or mockup, as follows:
    - a. Brush: Remove cement matrix to dull surface sheen and expose face of fine aggregate; with no significant reveal.
    - b. Light: Expose fine aggregate with occasional exposure of coarse aggregate and uniform color; with maximum reveal of 1/16 inch (1.5 mm).
    - c. Medium: Generally expose coarse aggregate; with slight reveal, a maximum of 1/4 inch (6 mm).
    - d. Heavy: Expose and reveal coarse aggregate to a maximum projection of one-third its diameter; with reveal range of 1/4 to 1/2 inch (6 to 13 mm).
- D. Bushhammer Finish: Allow concrete to cure at least 14 days before starting bushhammer surface finish operations.

1. Surface Continuity: Perform bushhammer finishing in as continuous an operation as possible, maintaining continuity of finish on each surface or area of Work. Maintain required patterns or variances of cut as shown on Drawings or to match design reference sample or mockup.
2. Surface Cut: Maintain required depth of cut and general aggregate exposure. Use power tool with hammer attachments for large, flat surfaces, and use hand hammers for small areas, at corners and edges, and for restricted locations where power tools cannot reach.
3. Remove impressions of formwork and form facings with exception of tie holes.

### 3.6 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with ACI 301 for hot-weather protection during curing.
- B. Begin curing cast-in-place architectural concrete immediately after removing forms from concrete. Cure according to ACI 308.1, by one or a combination of the following methods that will not mottle, discolor, or stain concrete:
  1. Moisture Curing: Keep exposed surfaces of cast-in-place architectural concrete continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
  2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period; use cover material and waterproof tape.
  3. Curing Compound: Mist concrete surfaces with water. Apply curing compound uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

### 3.7 REPAIRS, PROTECTION, AND CLEANING

- A. Repair and cure damaged finished surfaces of cast-in-place architectural concrete when approved by Architect. Match repairs to color, texture, and uniformity of surrounding surfaces and to repairs on approved mockups.
  1. Remove and replace cast-in-place architectural concrete that cannot be repaired and cured to Architect's approval.
- B. Protect corners, edges, and surfaces of cast-in-place architectural concrete from damage; use guards and barricades.
- C. Protect cast-in-place architectural concrete from staining, laitance, and contamination during remainder of construction period.

- D. Clean cast-in-place architectural concrete surfaces after finish treatment to remove stains, markings, dust, and debris.
- E. Wash and rinse surfaces according to concrete finish applicator's written recommendations. Protect other Work from staining or damage due to cleaning operations.
  - 1. Do not use cleaning materials or processes that could change the appearance of cast-in-place architectural concrete finishes.

**END OF SECTION**



## **SECTION 03 54 16**

### **CEMENT-BASED UNDERLAYMENT**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Cement-based, polymer-modified, self-leveling underlayment for application below interior floor coverings.
  - 1. Broad scope leveling of existing concrete floors scheduled to have existing flooring and associated adhesive removed, and new finish flooring applied.
  - 2. Transitioning leveling of floors to create uniform level height between different flooring materials.

##### **1.2 RELATED REQUIREMENTS**

- A. Section 01 22 00 - Unit Prices for underlayment unit prices.

##### **1.3 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data: For each type of product indicated.
  - 2. Shop Drawings: Include plans indicating substrates, locations, and average depths of underlayment based on survey of substrate conditions.
- B. Informational Submittals:
  - 1. Qualification Data: For qualified Installer.
  - 2. Product Certificates: Signed by manufacturers of underlayment and floor-covering systems certifying that products are compatible.
  - 3. Minutes of preinstallation conference.

##### **1.4 QUALITY ASSURANCE**

- A. Installer Qualifications: Installer who is approved by manufacturer for application of underlayment products required for this Project.
- B. Product Compatibility: Manufacturers of underlayment and floor-covering systems certify in writing that products are compatible.
- C. Preinstallation Conference: Conduct conference at Project site.

##### **1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Store materials to comply with manufacturer's written instructions to prevent deterioration from moisture or other detrimental effects.

## 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ventilation, ambient temperature and humidity, and other conditions affecting underlayment performance.
  - 1. Place cement-based underlayments only when ambient temperature and temperature of substrates are between 50 and 80 deg F (10 and 27 deg C).

## 1.7 COORDINATION

- A. Coordinate application of underlayment with requirements of floor-covering products and adhesives, to ensure compatibility of products.

# PART 2 PRODUCTS

## 2.1 CEMENT-BASED UNDERLAYMENTS

- A. Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in minimum uniform thickness of 1/8 inch (3 mm) and that can be feathered at edges to match adjacent floor elevations.
  - 1. Products:
    - a. Ardex; K-15 Self-Leveling Underlayment Concrete.
    - b. BASF Construction Chemicals, Inc.; MBT Mastertop 110 Plus Underlayment.
    - c. Dayton Superior Corporation; Levelayer.
    - d. L&M Construction Chemicals, Inc.; Levelex.
    - e. MAPEI Corporation; Ultraplan 1 Plus.
  - 2. Cement Binder: ASTM C150/C150M, portland cement, or hydraulic or blended hydraulic cement as defined by ASTM C129.
  - 3. Compressive Strength: Not less than 4000 psi (27.6 MPa) at 28 days when tested according to ASTM C109/C109M.
- B. Water: Potable and at a temperature of not more than 70 deg F (21 deg C).
- C. Primer: Product of underlayment manufacturer recommended in writing for substrate, conditions, and application indicated.
  - 1. Primer shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for conditions affecting performance.
  - 1. Proceed with application only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. General: Prepare and clean substrate according to manufacturer's written instructions.
  - 1. Treat nonmoving substrate cracks according to manufacturer's written instructions to prevent cracks from telegraphing (reflecting) through underlayment.
  - 2. Fill substrate voids to prevent underlayment from leaking.
- B. Concrete Substrates: Mechanically remove, according to manufacturer's written instructions, laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants that might impair underlayment bond.
- C. Nonporous Substrates: For ceramic tile, quarry tile, and terrazzo substrates, remove waxes, sealants, and other contaminants that might impair underlayment bond, and prepare surfaces according to manufacturer's written instructions.
- D. Adhesion Tests: After substrate preparation, test substrate for adhesion with underlayment according to manufacturer's written instructions.

### 3.3 APPLICATION

- A. General: Mix and apply underlayment components according to manufacturer's written instructions.
  - 1. Close areas to traffic during underlayment application and for time period after application recommended in writing by manufacturer.
  - 2. Coordinate application of components to provide optimum underlayment-to-substrate and intercoat adhesion.
  - 3. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
- B. Apply primer over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply underlayment to produce uniform, level surface. Sloping of 1/8 inch in 10'-0" maximum is permitted to produce level surface.
  - 1. Feather edges to match adjacent floor elevations.
- D. Cure underlayment according to manufacturer's written instructions. Prevent contamination during application and curing processes.
- E. Transitioning Leveling: Apply underlayment as required to create uniform level height between different flooring materials, where transition strips are not indicated on Drawings. Leveling shall extend out as needed to conform to ADA requirements.
- F. Do not install floor coverings over underlayment until after time period recommended in writing by underlayment manufacturer.
- G. Remove and replace underlayment areas that evidence lack of bond with substrate, including areas that emit a "hollow" sound when tapped.

3.4 PROTECTION

- A. Protect underlayment from concentrated and rolling loads for remainder of construction period.

**END OF SECTION**

**SECTION 04 22 00**  
**CONCRETE UNIT MASONRY**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Decorative concrete masonry units.
- B. Mortar and grout.
- C. Masonry-joint reinforcement.
- D. Miscellaneous masonry accessories.

**1.2 DEFINITIONS**

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

**1.3 PREINSTALLATION MEETINGS**

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

**1.4 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data: For each type of product.
  - 2. Shop Drawings: For the following:
    - a. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
    - b. Reinforcing Steel: Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.
  - 3. Samples: For each type and color of the following:
    - a. Decorative CMUs.
    - b. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.
- B. Informational Submittals:
  - 1. Qualification Data: For testing agency.
  - 2. Material Certificates: For each type and size of the following:
    - a. Masonry units.
      - 1) Include data on material properties.
    - b. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
    - c. Grout mixes. Include description of type and proportions of ingredients.
    - d. Joint reinforcement.

- e. Anchors, ties, and metal accessories.
- 3. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
  - a. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C109/C109M for compressive strength, ASTM C1506 for water retention, and ASTM C91/C91M for air content.
  - b. Include test reports, according to ASTM C1019, for grout mixes required to comply with compressive strength requirement.
- 4. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to TMS 602/ACI 530.1/ASCE 6.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

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

#### 1.6 FIELD CONDITIONS

- A. 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.
- B. 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 surfaces from mortar droppings.

## **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 and will be within 20 feet (6 m) vertically and horizontally of a walking surface.
- C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
  - 1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

## 2.3 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  - 1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  - 2. Provide square-edged units for outside corners unless otherwise indicated.
- B. Decorative CMUs: ASTM C90.
  - 1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 2150 psi (14.8 MPa).
  - 2. Density Classification: Match existing.
  - 3. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph.
  - 4. Pattern and Texture:
    - a. Standard pattern, ground-face finish. Match Architect's samples.
    - b. Scored vertically so units laid in running bond appear as square units laid in stacked bond, standard finish. Match Architect's samples.
    - c. Triple scored vertically so units laid in running bond appear as vertical units laid in stacked bond (soldier courses), standard finish. Match Architect's samples.
  - 5. Colors: As indicated by manufacturer's designations.
  - 6. Special Aggregate: Provide units made with aggregate matching aggregate in Architect's sample.

## 2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C150/C150M, 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 C114.
- B. Hydrated Lime: ASTM C207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

- D. Colored Cement Products: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
  - 1. Colored Portland Cement-Lime Mix:
    - a. Manufacturers: Subject to compliance with requirements, provide one of the following:
      - 1) Essroc; i.design flamingo-BRIXMENT Blend.
      - 2) Holcim (US) Inc.; Rainbow Mortamix Custom Color Cement/Lime.
      - 3) Lafarge North America Inc.; Eaglebond Portland & Lime.
      - 4) Lehigh Hanson; HeidelbergCement Group; Lehigh Custom Color Portland/Lime Cement.
  - 2. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
  - 3. Pigments shall not exceed 10 percent of portland cement by weight.
- E. Water: Potable.

## 2.5 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A615/A615M or ASTM A996/A996M, Grade 60 (Grade 420).
- B. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
  - 1. Manufacturers: Subject to compliance with requirements, provide one of the following:
    - a. Heckmann Building Products, Inc.; #374: Steel-Wich.
    - b. Hohmann & Barnard, Inc.; RB Rebar Positioner.
    - c. Wire-Bond, Figure 8 Rebar Positioners.
- C. Masonry-Joint Reinforcement, General: Ladder type complying with ASTM A951/A951M.
  - 1. Interior Walls: Mill-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. Spacing of Cross Rods: Not more than 16 inches (407 mm) o.c.
  - 5. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.

## 2.6 TIES AND ANCHORS

- A. General: Ties and anchors shall extend at least 1-1/2 inches (38 mm) into masonry 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. Mill-Galvanized, Carbon-Steel Wire: ASTM A82/A82M, with ASTM A641/A641M Class 1 coating.
  - 2. Steel Plates, Shapes, and Bars: ASTM A36/A36M.



- C. 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.
  - 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A153M.

## 2.7 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene or urethane.
- B. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D226/D226M, Type I (No. 15 asphalt felt).

## 2.8 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
  - 1. Do not use calcium chloride in mortar or grout.
  - 2. Use portland cement-lime mortar unless otherwise indicated.
- 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 C270, 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 reinforced masonry, use Type N.
  - 2. For interior nonload-bearing partitions, Type O may be used instead of Type N.
- D. Colored-Aggregate Mortar: Produce required mortar color by using colored aggregates and natural color or white cement as necessary to produce required mortar color.
  - 1. Mix to match Architect's sample.
  - 2. Application: Use colored-aggregate mortar for exposed mortar joints with the following units:
    - a. Decorative CMUs.
- E. Grout for Unit Masonry: Comply with ASTM C476.
  - 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 C476, 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) as measured according to ASTM C143/C143M.

## **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 would impair mortar bond.
- B. Before installation, examine rough-in and built-in construction for piping systems to verify actual locations of piping.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.2 INSTALLATION, GENERAL**

- A. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match construction immediately adjacent to opening.
- B. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

### **3.3 TOLERANCES**

- A. Dimensions and Locations of Elements:
  - 1. For dimensions in cross section or elevation, do not vary by more than plus 1/2 inch (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).

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).

### 3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in bond pattern to match existing; 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. 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.
- G. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.
- H. Build nonload-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
  1. Install compressible filler in joint between top of partition and underside of structure above.

2. Fasten partition top anchors to structure above and build into top of partition. Grout cells of CMUs solidly around plastic tubes of anchors and push tubes down into grout to provide 1/2-inch (13-mm) clearance between end of anchor rod and end of tube. Space anchors 48 inches (1200 mm) o.c. unless otherwise indicated.
3. Wedge nonload-bearing partitions against structure above with small pieces of tile, slate, or metal. Fill joint with mortar after dead-load deflection of structure above approaches final position.
4. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Section 07 84 43 "Joint Firestopping."

### 3.5 MORTAR BEDDING AND JOINTING

- A. Lay hollow 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.
- B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

### 3.6 MASONRY-JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (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.

### 3.7 CONTROL AND EXPANSION JOINTS

- A. General: Install control- and expansion-joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry 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 temporary foam-plastic filler in head joints, and remove filler when unit masonry is complete for application of sealant.

### 3.8 LINTELS

- A. Provide concrete lintels where shown and where openings of more than 12 inches (305 mm) for brick-size units and 24 inches (610 mm) for block-size units are shown without structural steel or other supporting lintels.
- B. Install steel lintels where indicated.
- C. Provide minimum bearing of 8 inches (200 mm) at each jamb unless otherwise indicated.

### 3.9 REINFORCED UNIT MASONRY

- A. Placing Reinforcement: Comply with requirements in TMS 602/ACI 530.1/ASCE 6.
- B. 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).

### 3.10 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. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

### 3.11 MASONRY WASTE DISPOSAL

- A. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

## **END OF SECTION**

**SECTION 05 50 00**  
**METAL FABRICATIONS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Metal fabrications, including the following:
  - 1. Loose lintels.
  - 2. Steel weld plates and angles for casting into concrete not specified in other Sections.
  - 3. Steel framing and supports for countertops.
  - 4. Slotted channel framing
  - 5. Steel framing and supports for applications where framing and supports are not specified in other Sections.
  - 6. Miscellaneous angles, shapes and fabrications shown on the Drawings.
  - 7. Anchors, framing, fasteners and accessories for installation of the above.
  - 8. Design calculations for those items required to have such.
- B. Related Sections include the following:
  - 1. Painting: Section 09 91 00.
  - 2. Solid Surface Countertops: Section 12 36 62.

**1.2 PERFORMANCE REQUIREMENTS**

- A. Delegated Design:
  - 1. Design metal fabrications, including engineering calculations prepared by a qualified Structural Engineer, using structural performance requirements and design criteria indicated herein.
  - 2. Contractor is responsible for the engineering and design of components and materials, as well as the installation of the metal fabrications.
- B. Supports for Countertops:
  - 1. Dead load of counters.
  - 2. Uniform Load: 50 pounds per linear foot of counter.
  - 3. Concentrated Load Downward: 200 pounds at any point on the counter.
  - 4. Limit deflection to L/360 between supports.
- C. Information on Drawings and in the Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated on the Drawings by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines and relationships to one another and to adjoining construction. Performance characteristics are indicated by criteria specified herein subject to verification as specified.

1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's written approval and only to the extent needed to comply with performance requirements. Where modifications are proposed, submit comprehensive explanatory data to Architect in accordance with Section 01 60 00 "Product Requirements" for review prior to submittal of shop drawings.

### 1.3 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details for metal fabrications.
  1. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
  2. Provide templates for anchors and bolts specified for installation under other Sections.
  3. Where fabrications require calculations, provide shop drawings sealed and signed by the same State of Illinois Licensed Structural Engineer that prepared calculations.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Product Data: For the following:
  1. Grout.
  2. Shop and zinc primer.
- B. Welding certificates.
- C. Qualification Data: For Structural Engineer.
- D. Design Calculations: Provide for fabricated items requiring design calculations to substantiate design and installation conditions, prepared, sealed, and signed by a State of Illinois Licensed Structural Engineer. Submit design calculations for the following:
  1. Metal pan (open grating, steel floor plate) stairs.
  2. Countertop support framing.

### 1.5 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Welding: Qualify procedures and personnel according to the following:
  1. AWS D1.1, Structural Welding Code--Steel.
  2. AWS D1.2, Structural Welding Code--Aluminum.
  3. AWS D1.3, Structural Welding Code--Sheet Steel.
  4. AWS D1.6, Structural Welding Code--Stainless Steel.
- C. Comply with AISC Manual.
  1. Code of Standard Practice for Steel Buildings and Bridges.
  2. Specifications for the Design, Fabrication and Erection of Structural Steel for Buildings.
- D. Specifications for Structural Joints Using High Strength Steel as approved by the Research Council on Structural Connections.

- E. General Requirements for Delivery of Rolled Steel Plates, Shapes, and Bars for Structural Use: ASTM A 6.
- F. Bar Grating: Comply with NAAMM, Metal Bar Grating Manual.
- G. Qualifications for Welding Work:
  - 1. Qualify welding processes and welding operators in accordance with the AWS, Standard Qualification Procedure.
  - 2. Provide certification that welders to be employed in the work have satisfactorily passed AWS qualification tests within the previous twelve months. Provide recertification of welders as required.
- H. Comply with applicable portions of National Association of Architectural Metal Manufacturers (NAAMM) Metal Stairs and Pipe Railing Manuals.

#### 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with metal fabrications by field measurements before fabrication and indicate measurements on shop drawings.
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate wall and other contiguous construction to ensure that actual dimensions correspond to established dimensions.
  - 2. Provide allowance for trimming and fitting at site.

#### 1.7 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to project site in time for installation.
- B. Coordinate installation of steel weld plates and angles for casting into concrete that are specified in this Section but required for work of another Section. Deliver such items to project site in time for installation.

### **PART 2 PRODUCTS**

#### 2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
  - 1. Products: Subject to compliance with requirements, provide one of the products specified.
  - 2. Manufacturers: Subject to compliance with requirements, provide products by one of the manufacturers specified.



## 2.2 METALS - GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces, unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.

## 2.3 MATERIALS

- A. W-Shapes: ASTM A 992, Grade 50.
- B. Channels and Angles: ASTM A 36.
- C. Steel Plates, Shapes, and Bars: ASTM A 36.
- D. Steel Sheet:
  - 1. Cold-Rolled: ASTM A 1008, Type B, structural steel, Grade 25, unless another grade is required by design loads indicated.
  - 2. Hot-Rolled: ASTM A 1011, Type B, or structural steel, Grade 30, unless another grade is required by design loads.
- E. Stainless Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.
- F. Stainless Steel Bars and Shapes: ASTM A 276, Type 304.
- G. Steel Tubing: ASTM A 500, cold-formed steel tubing.
- H. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads, black, galvanized for exterior or as noted on the Drawings.
- I. Stainless Steel Pipe and Tubing: ASTM A 554, Type 304.
- J. Steel Bars for Grating: ASTM A 569 or ASTM A 36.
- K. Stainless Steel Shapes: ASTM A 276, Type 304 and Type 316 where indicated herein.
- L. Rolled Steel Floor Plates: ASTM A 786, rolled from plate complying with ASTM A 36 or ASTM A 283, Grade C or D. Provide manufacturer's standard raised diamond pattern.
- M. Rolled Aluminum Alloy Tread Plate: ASTM B 632, alloy 6061-T6. Provide manufacturer's standard diamond pattern.
- N. Slotted Channel Framing: Cold-formed metal box channels (struts) complying with MFMA-4. Continuously slotted steel channels with in-turned lips, size and series as shown on the Drawings, if not shown, as required to support and resist the imposed loads, with assembly and mounting hardware as required by conditions of the fabrication and installation.
  - 1. Size of Channels: 1-5/8 by 1-5/8 inches unless otherwise indicated on the Drawings.
  - 2. Material: Cold-rolled steel, ASTM A 1008, structural steel, Grade 33, 0.0528-inch minimum thickness; galvanized after fabrication.
  - 3. Product: "Unistrut" (Unistrut Corporation, Wayne MI 48184) or other as approved by Architect.
  - 4. Medical Support Systems:
    - a. Cooper B-Line, Inc., Highland, IL.

- b. Flex-Strut, Inc. Metal Framing Products, Warren, OH.
- c. "Globe Strut" (GS Metals Corporation).
- d. "Hilti Strut MQ" (Hilti, Inc.).

## 2.4 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless steel fasteners for exterior use and zinc plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, at exterior walls. Provide stainless steel fasteners for fastening aluminum. Select fasteners for type, grade, and class required.
- B. High-Strength Bolts, Nuts, and Washers: ASTM F 3125/F 3125M, Grade A325, Type 3, heavy-hex steel structural bolts; ASTM A 563, Grade DH3, heavy-hex carbon-steel nuts; and where indicated, flat washers.
- C. Steel Bolts and Nuts: Regular hexagon head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- D. Stainless Steel Bolts and Nuts: Regular hexagon head annealed stainless steel bolts, nuts and, where indicated, flat washers; ASTM F 593 for bolts and ASTM F 594 for nuts, Alloy Group 1.
- E. Anchor Bolts: ASTM F 1554, Grade 36.
  - 1. Provide hot-dip or mechanically deposited, zinc coated anchor bolts where item being fastened is indicated to be galvanized.
- F. Eyebolts: ASTM A 489.
- G. Machine Screws: ASME B18.6.3.
- H. Lag Bolts: ASME B18.2.1.
- I. Wood Screws: Flat head, ASME B18.6.1.
- J. Plain Washers: Round, ASME B18.22.1.
- K. Lock Washers: Helical, spring type, ASME B18.21.1.
- L. Cast-in-Place Anchors in Concrete: Anchors capable of sustaining, without failure, a load equal to four times the load imposed, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- M. Expansion Anchors: Anchor bolt and sleeve assembly with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
  - 1. Material for Anchors in Interior Locations: Carbon steel components zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
  - 2. Material for Anchors in Exterior Locations: Alloy Group 1 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.
  - 3. Provide one of the following:
    - a. "Kwick Bolt 3" (Hilti Corporation, Tulsa, OK 74121).
    - b. "Expansion Anchors" (Dur-O-Wall, Hauppauge, NY, 11788).
    - c. "Expansion Anchors" (ITW Redhead, Addison, IL 60101).

- N. Power Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion resistant materials, with capability to sustain, without failure, a load equal to ten times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency. Provide manufacturer's substantiating data for each type and condition used as part of submittals.
- O. Chemical Fasteners: Insert type stud bonding system anchor for use with hardened portland cement concrete, and tension and shear capacities appropriate for application.
  - 1. Bonding Material: ASTM C 881, Type IV, Grade 3, two component epoxy resin suitable for surface temperature of hardened concrete where fastener is to be installed.
  - 2. Stud: ASTM A 307, zinc coated carbon steel with continuous thread on stud, unless otherwise indicated.
  - 3. Washer and Nut: Zinc coated steel.

## 2.5 MISCELLANEOUS MATERIALS

- A. Wedge Inserts (Shelf Angle Support Insert Assembly):
  - 1. Heavy box type ferrous casting inserts, duty ductile iron complying with ASTM A 47 or cast steel complying with ASTM A 27, hot-dip galvanized in accordance with ASTM A 153, with carbon steel wedge shaped askew bolts, round washers, shimmed washers and hex nuts hot-dip galvanized in accordance with ASTM A 153, insert size, bolt sizes and shear loads as shown on the Drawings, one of the following:
    - a. Dayton Superior, No. F-7-H, Miamisburg, OH 45342.
    - b. Heckmann Building Products, Inc., No's. 425 & 427, Chicago, IL 60624.
    - c. Hohmann & Barnard, Inc., Type LW or HW, Hauppauge, NY 11788.
  - 2. Provide wedge inserts to Cast-in-Place Concrete Contractor for insertion into concrete formwork.
- B. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- C. Universal Shop Primer: Fast curing, lead and chromate free, universal modified alkyd primer complying with MPI #79.
  - 1. Use primer with a VOC content of 3.5 lb/gal. or less when calculated according to 40CFR59, Subpart D (EPA Method 24).
  - 2. Use primer containing pigments that make it easily distinguishable from zinc rich primer.
  - 3. Provide one of the following:
    - a. "OEM" (Carboline Company, St. Louis, MO 63144).
    - b. "Series 10-1009" (Tnemec, Company, Inc., Kansas City, MO 64141).
    - c. "Amercoat 185H" (PPG).
- D. Zinc Rich Primer: Complying with SSPC-Paint 20 or SSPC-Paint 29 and compatible with topcoat.
  - 1. Use primer with a VOC content of 3.5 lb/gal. or less when calculated according to 40CFR59, Subpart D (EPA Method 24).
  - 2. Products:
    - a. "Carbozinc 621" (Carboline Company).
    - b. "Amercoat 68HS" (PPG Ameron).

c. "Tneme-Zinc 90-97" (Tnemec Company, Inc.).

- E. Galvanizing Repair Paint: High zinc dust content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- F. Bituminous Paint: Cold applied asphalt emulsion complying with ASTM D 1187.
- G. Nonshrink, Nonmetallic Grout: Factory packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- H. Concrete Materials and Properties: Comply with requirements in Section 03 30 00 - Cast-in-Place Concrete for normal weight, air entrained, ready mix concrete with a minimum 28-day compressive strength of 3,000 psi, unless otherwise indicated.

2.6 FABRICATION - GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch, unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- C. Form bent metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. Form exposed work true to line and level with accurate angles and surfaces and straight edges.
- E. Weld corners and seams continuously to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts, unless otherwise indicated. Locate joints where least conspicuous.
- G. Fabricate seams and other connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- H. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.

## 2.7 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.
  - 1. Furnish inserts if units are installed after concrete is placed.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes indicated with attached bearing plates, anchors, and braces as indicated. Drill bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition shop drawings.
- D. Galvanize miscellaneous framing and supports where indicated.
- E. Prime miscellaneous framing and supports with zinc rich primer where indicated.

## 2.8 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated. Weld adjoining members together to form a single unit where indicated.
- B. Size loose lintels to provide bearing length at each side of openings equal to 1/12 of clear span but not less than 8 inches, unless otherwise indicated.
- C. Galvanize loose steel lintels located in exterior walls.

## 2.9 SHELF ANGLES

- A. Fabricate structural steel shelf angles of sizes shown on the Drawings for attachment to the building frame. Fabricate with slotted holes to receive 3/4 inch diameter bolts spaced not more than 24 inches o.c. and not less than 6 inches from end of angles unless shown otherwise on the Drawings. At inside and outside corners, provide mitered or coped angles to extend the horizontal leg into the corner for support of brick and flashing.
- B. Provide galvanize shelf angles to be installed on exterior concrete framing.
- C. Provide stainless steel shelf angles where in direct contact with limestone or granite.
- D. Furnish wedge type concrete insert assemblies complete with askew head bolts for attachment of angles to cast-in-place concrete.

## 2.10 MISCELLANEOUS STEEL TRIM

- A. Unless otherwise indicated, fabricate units from steel shapes, plates, and bars of profiles shown with continuously welded joints and smooth exposed edges. Miter corners and use concealed field splices where possible.
- B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work.

1. Provide with integrally welded steel strap anchors for embedding in concrete or masonry construction.
  - C. Galvanize exterior miscellaneous steel trim and interior miscellaneous steel trim, where indicated.
- 2.11 FINISHES - GENERAL
- A. Comply with NAAMM's - Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designating finishes.
  - B. Finish metal fabrications after assembly.
- 2.12 STEEL FINISHES
- A. Galvanizing: In addition to items and fabrications indicated herein and on the Drawings, galvanize exterior items, products and fabrications unless indicated otherwise. Hot-dip galvanize items as indicated to comply with applicable standard listed below:
    1. ASTM A 123 for galvanizing steel and iron products.
    2. ASTM A 153 for galvanizing steel and iron hardware.
  - B. Preparation for Shop Priming: Prepare uncoated ferrous metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed metal fabrications:
    1. Exteriors (SSPC Zone 1B) (and Items Indicated to Receive Zinc Rich Primer): SSPC-SP 6/NACE No. 3, Commercial Blast Cleaning.
    2. Interiors (SSPC Zone 1A): SSPC-SP-3, Power Tool Cleaning.
  - C. Shop Priming: Apply shop primer to uncoated surfaces of metal fabrications, except those with galvanized finishes and those to be embedded in concrete, sprayed-on fireproofing, or masonry, unless otherwise indicated. Comply with SSPC-PA-1, Paint Application Specification No.1, Shop, Field, and Maintenance Painting of Steel, for shop painting.
    1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

### **PART 3 EXECUTION**

- 3.1 INSTALLATION - GENERAL
- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
  - B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
  - C. Field Welding: Comply with the following requirements:

1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  2. Obtain fusion without undercut or overlap.
  3. Remove welding flux immediately.
  4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag bolts, wood screws, and other connectors.
- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- F. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with a heavy coat of bituminous paint.
- 3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS
- A. General: Install framing and supports to comply with requirements of items being supported, including manufacturers' written instructions and requirements indicated on shop drawings.
- B. Anchor supports for operable partitions securely to and rigidly brace from building structure.
- 3.3 ADJUSTING AND CLEANING
- A. Touch-up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop painted surfaces.
1. Apply by brush or spray to provide a minimum 2.0 mil dry film thickness.
- B. Touch-up Painting: Cleaning and touch-up painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 09 91 00 - Painting.
- C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.
- 3.4 INSPECTION AND TESTS
- A. The testing laboratory will make inspections and perform tests in accordance with the following:
1. Verify that certification of welders is not more than one year prior to time welding work is to be performed.
  2. Visually inspect shop and field welds. Conform with AWS D1.1., Structural Welding Code for Steel.
  3. Test bolted connections made either in the shop or in the field in accordance with the following:

- a. Test bolted connections by the calibrated wrench method as outlined in the Specifications for Assembly of Structural Joints Using High Strength Steel Bolts hereinbefore specified. The testing laboratory is responsible for the proper calibration of the wrench used.
  - b. Test 10 percent of installed bolts as specified, with a minimum of two bolts for each connection being tested.
- B. Correct deficiencies in metal fabrication work which inspections and tests have indicated to be in non-compliance with the requirements of the Contract Documents. Perform additional tests, at Contractor's expense as may be necessary to reconfirm any noncompliance or original work, and as may be necessary to show compliance of corrected work.

**END OF SECTION**



## **SECTION 06 10 00**

### **ROUGH CARPENTRY**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Rough carpentry and framing, including the following:
  - 1. Wood framing, blocking, furring, nailers, and grounds for the anchor or support of other items or construction as necessary to render the work secure and complete.
  - 2. Wood preservative treatment for lumber and plywood.
  - 3. Wood fire retardant treatment for lumber and plywood.
  - 4. Anchors, fasteners, and hardware.
- B. Related Sections:
  - 1. Plastic laminate casework: Section 06 41 00.
  - 2. Flush wood doors: Section 08 14 16.
  - 3. Gypsum board: Section 09 29 00.

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

- A. Shop Drawings, Glue Laminate Members: Show laminate members, indicate configurations, dimensions, span, pitch, camber, and material species. Show connections.

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

- A. Product data for the following products:
  - 1. Underlayment.
  - 2. Metal framing anchors.
  - 3. Sill sealer.
  - 4. Air infiltration barrier.
- B. Certification:
  - 1. Submit certification by treating plant stating chemicals and process used, net amount of salts retained and conformance with applicable standards.
  - 2. Preservative Treated Wood: Submit certification for waterborne preservative that moisture content was reduced to 19 percent maximum, after treatment for lumber and 15 percent for plywood.
  - 3. Fire Retardant Treatment: Submit certification by treating plant that fire retardant treatment materials comply with governing ordinances and that treatment will not bleed through finished surfaces.
- C. Research or evaluation reports of the model code organization acceptable to authorities having jurisdiction that evidence the following products' compliance with building code in effect for project.

1. Engineered wood products.
2. Metal framing anchors.

#### 1.4 QUALITY ASSURANCE

##### A. Grading Rules:

1. Provide lumber conforming to the grading rules and wood species of the DOC Voluntary Product Standard PS-20. Grading rules of the following associations also apply to materials produced under their supervision:
  - a. Northeastern Lumber Manufacturer's Association, Inc. (NELMA).
  - b. Southern Pine Inspection Bureau (SPIB).
  - c. West Coast Lumber Inspection Bureau (WCLIB).
  - d. Western Wood Products Association (WWPA).
2. Provide plywood conforming to the following:
  - a. Softwood Plywood - Construction and Industrial: DOC Product Standard PS-1.
  - b. Hardwood Plywood: DOC Product Standard PS-51.

##### B. Grading Marks: Identify lumber and plywood by official grade mark.

1. Lumber: Grade stamp to contain symbol of grading agency, mill number or name, grade of lumber, species or species grouping or combination designation, rules under which graded, where applicable and condition of seasoning at time of manufacture.
  - a. S-Dry: Maximum 19 percent moisture content.
  - b. MC-5 or KD: Maximum 15 percent moisture content.
  - c. Dense.
2. Softwood Plywood: Maximum grade trademark of the APA The Engineered Wood Association.
  - a. Type, grade, class and identification index.
  - b. Inspection, testing or grading agency.
3. Hardwood Plywood: Appropriate grade mark of qualified inspection, testing or grading agency.

##### C. Testing: ASTM E 84, maximum 25 flame spread rating.

##### D. Requirements of Regulatory Agencies:

1. Fire Hazard Classification: Underwriters' Laboratories, Inc., for treated lumber and plywood.
2. Pressure Preservative Treated Lumber and Plywood: American Wood Preservers' Association Standards.
3. Span Tables: American Forest & Paper Association (AFPA) American Wood Council (AWC).
4. Working Stresses: Softwood Lumber, National Design Specification, American Forest & Paper Association (AFPA) American Wood Council (AWC).

##### E. Glue Laminated Structural Units:

1. Provide glue laminated members bearing the American Institute of Timber Construction (AITC) Quality Control Mark.
2. Glue laminate supplier is to be a firm licensed by the American Institute of Timber Construction to use AITC Quality Inspection Marks and to ensure the AITC Certificate of Conformance.

3. Comply with AITC 111, Recommended Practice for Protection of Structural Glue-Laminate Timber During Transit, Store and Erection.
  - F. Framing Standard: Comply with AFPA, Manual for Wood Frame Construction, unless otherwise indicated herein or required by governing codes.
  - G. Nailing:
    1. Recommended Nailing Schedule of referenced framing standard and with AFPA, National Design Specifications for Wood Construction.
    2. Roof Sheathing Fastening Schedules for Wind Uplift, APA The Engineered Wood Association.
- 1.5 DELIVERY, STORAGE AND HANDLING
- A. Immediately upon delivery to job site, place materials in area protected from weather.
  - B. Store materials a minimum of 6 inches above ground on framework or blocking and cover with protective waterproof covering, providing adequate air circulation or ventilation.
  - C. Do not store seasoned materials in wet or damp areas.
  - D. Protect fire retardant materials against high humidity and moisture during storage and erection.
  - E. Protect sheet materials from corners breaking and damaging surfaces, while unloading.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- A. Lumber:
  1. Dimension:
    - a. Specified lumber dimensions are nominal.
    - b. Actual dimensions conform to industry standards established by the American Lumber Standards Committee and the rules writing agencies.
  2. Moisture Content: 19 percent maximum at time of permanent closing in of building or structure for lumber 2 inches or less nominal thickness.
  3. Surfacing: Surface four sides (S4S), unless otherwise shown on the Drawings or specified.
  4. Framing lumber, 2 inch to 4 inch thick, 2 inch to 4 inch wide, any commercial softwood species, unless otherwise shown on the Drawings or specified.
    - a. Light Framing:
      - 1) General Framing: DF-L, Stud Grade and Better Grade.
      - 2) Plates, Blocking, Bracing and Nailers: DF-L, No.2 or Better Grade.
    - b. Studs:
      - 1) Load-bearing: DF-L, Select Structural, No. 2 or Better Grade.
      - 2) Non-load-bearing: DF-L, Stud Grade, Standard Grade.
    - c. Structural Light Framing (beams and posts), 2 inch to 4 inch thick, 2 inch and wider: DF-L, Select Structural, No.2 or Better Grade.
    - d. Joists: DF-L, Select Structural, No.2 or Better Grade.

- e. Appearance Framing, 2 inch to 4 inch thick, 2 inches and wider: Appearance Grade, 15 percent maximum moisture content, MC-15 or KD on grade stamp.
- 5. Boards: 1 inch to 2 inch thick; any commercial softwood species, unless otherwise shown on the Drawings or specified:
  - a. Furring and Grounds: Minimum, No. 2 Common Grade.
- B. Plywood:
  - 1. Roof and Wall Sheathing: APA Rated Sheathing, Exterior (Exposure 1), thickness as shown on the Drawings or if not shown provide 3/4 inch thick panels.
  - 2. Roof and Wall Sheathing (Structural): APA Structural 1 Rated Sheathing, Exposure 1, thickness as shown on the Drawings or if not shown provide 3/4 inch thick panels.
  - 3. Subfloor: APA Rated Sheathing, Exposure 1, tongue-and-groove, thickness as shown on the Drawings or if not shown provide 3/4 inch thick panels.
  - 4. Combination Subfloor Underlayment: APA Rated Stud-I-Floor, Exposure 1, tongue-and-groove, 3/4 inch thick unless noted otherwise on the Drawings.
  - 5. Underlayment: APA C-C Plugged, Exposure Durability, Exterior, in areas where moisture is present, fire retardant treated, tongue-and-groove, 3/4 inch thick unless noted otherwise on the Drawings.
  - 6. Marine Plywood: APA B-B Marine Grade, 3/4 inch thick unless noted otherwise on the Drawings.
- C. Preservative Treatment by Pressure Process: AWWA U1, pressure treated preservatives for painted, stained or exposed natural wood products. Provide kiln dry material after treatment to a maximum moisture content of 19 percent for lumber and 15 percent for plywood:
  - 1. Category UC2 for interior construction not in contact with ground.
  - 2. Category UC3b for exterior construction not in contact with ground.
  - 3. Category UC4a for items in contact with ground.
- D. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame-spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet beyond the centerline of the burners at any time during the test.
  - 1. Treatment shall not promote corrosion of metal fasteners.
  - 2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
  - 3. Design Value Adjustment Factors: Treated lumber shall be tested according to ASTM D 5664 and design value adjustment factors shall be calculated according to ASTM D 6841. For enclosed roof framing, framing in attic spaces, and where high temperature fire-retardant treatment is indicated, provide material with adjustment factors of not less than 0.85 modulus of elasticity and 0.75 for extreme fiber in bending for Project's climatological zone.
- E. Sill Seal: Compressible foam plastic seal, same width as sill plate roll form, Amofoam Sill Sealer, as manufactured by Amco Foam Products Company, Smyrna, GA 30080 or other as approved by Architect.

- F. Air Infiltration Barrier: Spunbound polyethylene fiber sheeting, complying with ASTM E 1677, Type I, Tyvek Housewrap as manufactured by DuPont Company, Wilmington DE 19880 or other approved by Architect.

## 2.2 METAL FRAMING ANCHORS AND HARDWARE

- A. General: Provide galvanized steel framing anchors of structural capacity, type, and size indicated and as follows:
  - 1. Research or Evaluation Reports: Provide products for which model code research or evaluation reports exist that are acceptable to authorities having jurisdiction and that evidence compliance of metal framing anchors for application indicated with building code in effect for project.
  - 2. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer that meet or exceed those indicated. Manufacturer's published values are to be determined from empirical data or by rational engineering analysis, and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- B. Galvanized Steel Sheet: Hot-dip, zinc coated steel sheet complying with ASTM A 653, G60 coating designation; structural, commercial, or lock forming quality, as standard with manufacturer for type of anchor indicated.
- C. Wall Bracing: T-shaped bracing made for letting into studs in saw kerf, 1-1/8 inches wide by 9/16 inch deep by 0.034 inch thick with hemmed edges.
- D. Rough Hardware: Zinc coated steel, unless otherwise shown on the Drawings or specified:
  - 1. Bolts: FS FF-B-575C.
  - 2. Nuts: FS FF-N-836C.
  - 3. Expansion Shields: FS FF-B-561C.
  - 4. Lag Screws and Bolts: FS FF-B-561C.
  - 5. Toggles Bolts: FS FF-B-588C.
  - 6. Wood Screws: FS FF-S-111D.
  - 7. Nails and Staples: FS FF-N-105B.
  - 8. Joist Hangers: Minimum 18 gage.
  - 9. Metal Cross Bridging: 16 gage.
  - 10. Bar and Strap Anchors: ASTM A 525, minimum 18 gage, hot-dip galvanized.
  - 11. Plyclips: Extruded aluminum alloy, ASTM B 221, 6063-T6.
- E. Acceptable Metal Framing Anchor Manufacturers:
  - 1. Heckman Building Products, Chicago, IL 60624.
  - 2. KC Metal Products, Inc., San Jose, CA 95131.
  - 3. Simpson Strong-Tie Company, Inc., Pleasanton, CA 94588.
  - 4. Southeastern Metal Manufacturing Company, Jacksonville, FL 32218.

### **PART 3 EXECUTION**

#### **3.1 PREPARATION**

- A. Examine surfaces to receive the parts of the work specified herein. Verify dimensions of in-place and subsequent construction. Application or installation of materials constitutes acceptance of existing conditions.

#### **3.2 INSTALLATION**

- A. General: Frame wood members to a close fit, set accurately to required lines and levels and secure rigidly in place in accordance with the Drawings. Cut to fit framing, blocking, etc. to accommodate other work.
- B. Nailing: Provide as a minimum nailed connections for wood framing members in accordance with the National Design Specifications for Wood Construction, American Forest & Paper Association but not less than specified below, unless otherwise noted on the Drawings. Provide nails shown and noted as common unless otherwise noted. Clinch ends of nails which project from wood members when direct nailing is indicated.
  - 1. Studs and Plates:
    - a. Stud to Sole Plate: Toe-Nail, 4-8d or 2-16d (Direct).
    - b. Stud to Cap Plate: Toe-Nail, 2-14d.
    - c. Double Studs: Direct, 10d: 12 inches o.c. or 16d 24 inches o.c.
    - d. Corner Studs: Direct, 16d: 24 inches o.c.
    - e. Sole Plate to Joist or Blocking: Direct, 16d: 16 inches o.c.
    - f. Double Cap Plate: Direct, 16d: 16 inches o.c.
    - g. Cap Plate Laps: Direct, 2-16d.
  - 2. Headers and Girders:
    - a. Built-Up Girders and Beams: Direct, 20d at 32 inches o.c. top and bottom edge staggered 2-20d at ends.
    - b. Continuous Header - Two Pieces: Direct, 16d at 16 inches o.c. each edge.
- C. Sills:
  - 1. Set preservative wood treated sills on specified continuous foam sill sealer flush exterior face of foundation unless shown otherwise on the Drawings. Impale foam sealer over anchor bolts and butt end joints together (not lapped).
  - 2. Secure sills with 5/8 inch diameter x 10 inch long with 2 inch hook minimum size anchor bolts embedded in the structure minimum 8 inches, spaced maximum 4 feet o.c.
  - 3. Join solid sill members with halved joints, where not continuous and at corners, minimum 1 foot lapped joint.
  - 4. Lap built-up sill members minimum distance 2 feet.
- D. Bridging: Install bridging not to exceed 6 feet o.c.
  - 1. Metal Cross Bridging: Install nailable type with two 8d nails in each end, leaving a space between members minimum of 1/8 inch.
  - 2. Wood Cross Bridging:
    - a. Install 1 inch x 4 inch wood strips with beveled ends in double cross manner.
    - b. Secure cross bridging with two 8d nails in each end.

- c. Nail bottom end of cross bridge strips after subfloor is installed.
  - 3. Solid Bridging: (Where shown on Drawings)
    - a. Size: 2 inch thickness x 2 inch less in height than joists, length to suit.
    - b. Install offset to permit toenailing or endnailing.
    - c. Space Bridging Maximum:
      - 1) Spans to 10 feet: one row midspan.
      - 2) Spans 10 feet to 18 feet: two rows at 1/3 span.
      - 3) Spans over 18 feet: rows not over 6 feet apart.
- E. Plywood Wall Sheathing:
  - 1. Install with face grain horizontal.
  - 2. Allow minimum 1/16 inch space at end joints and 1/8 inch at edge joints; double these spacings under wet or humid conditions.
  - 3. Nail 6 inches o.c. along panel edges and 12 inches o.c. at intermediate supports with 6d common nails for panels 1/2 inch thickness and less and 8d nails for greater thicknesses.
- F. Subfloor and Underlayment:
  - 1. Install subfloor with face grain perpendicular to joists, end joint supported on joists. Install underlayment perpendicular to subfloor.
  - 2. Install lumber blocking between joists when tongue-and-groove panels are not used.
  - 3. Stagger end joints.
  - 4. Butt ends and edges, allowing 1/16 inch space between panels.
  - 5. Nail plywood 3/4 inch thick or less maximum of 6 inches o.c. at panel edges and 10 inches o.c. at intermediate supports with 6d ring shank or screw type nails with 1 inch penetration into structural members, except when supports are spaced 48 inches o.c., space nails maximum of 6 inch o.c. at supports with 1 inch penetration.
  - 6. Nail plywood 7/8 inch thick and greater with 8d common nails spaced maximum of 6 inches o.c. at panel edges and 10 inches at intermediate supports.
  - 7. Set nail heads into plywood 1/32 inch without dimpling surface or breaking surface fiber.
- G. Air Infiltration Barrier:
  - 1. Install over sheathing a continuous air infiltration barrier attached to the sheathing with non-corrosive staples of the type recommended by the air barrier manufacturer.
  - 2. Lap seams minimum 2 inches and seal at top and bottom edges of wall with duct tape or a similar sheathing tape as recommended by the air barrier manufacturer.
  - 3. Cut in windows, doors and other penetrations and pull air barrier into opening and staple or attach ends to the inside of the opening.
- H. Fire Retardant Treated Wood Products:
  - 1. Provide fire retardant treated wood for framing, blocking, furring, nailing strips, and plywood where shown on the Drawings and required by local codes.
  - 2. Apply two brush coats of same treatment used in original treatment to sawn or cut surfaces of fire treated lumber and plywood.
- I. Pressure Treated Wood Products:

1. Provide pressure treated wood for framing, blocking, furring and nailing strips built into exterior and masonry walls, wood in contact with masonry or concrete and in conjunction with flashing, coping and roofing membranes.
2. Apply two brush coats of same preservative used in original treatment to sawn or cut surfaces of treated lumber.

**END OF SECTION**



## **SECTION 06 41 00**

### **ARCHITECTURAL WOOD CASEWORK**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Custom fabricated plastic-laminate-clad casework, including the following:
  - 1. Casework Fabrications:
    - a. Freestanding casework.
    - b. Countertops.
    - c. Base and wall cabinets.
    - d. Built-in casework.
  - 2. Hardware, accessories, and trims for complete fabrication and installation.
  - 3. Wood furring, blocking, shims, and hanging strips for installing architectural casework that are not concealed within other construction.
  - 4. Site installation.
- B. Related Requirements:
  - 1. Rough carpentry: Section 06 10 00.
  - 2. Glazing: Section 08 80 00.
  - 3. Plastic-laminate countertops: Section 12 36 23.
  - 4. Solid surface countertops: Section 06 61 16.

##### **1.2 COORDINATION**

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

##### **1.3 PREINSTALLATION MEETINGS**

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

##### **1.4 ACTION SUBMITTALS**

- A. Product Literature:
  - 1. Manufactured materials description, manufacturer's catalog cut sheets of casework/cabinet hardware indicating model numbers and finishes of each item used in fabrication.
  - 2. Manufacturer's literature for fire retardant treated materials.
- B. Shop Drawings: Submit shop drawings showing location of each item, dimensioned plans and elevations, large scale details, hardware, finishes, anchors and other components. Indicate compliance with specified standards and other specified requirements for materials and workmanship.

- C. Samples: Samples will be reviewed for appearance and finish only. Compliance with other requirements is the exclusive responsibility of the Contractor.
  - 1. Submit sample chains of plastic laminate and cabinet liner for color and pattern selection by Architect.
  - 2. Cabinet/Casework Hardware: Each item specified used in the fabrications, in finish indicated herein.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Certification:
  - 1. Copies of certificate signed by the Fabricator/Installer, certifying that the work complies with the quality standards, grades and other requirements as referenced and specified herein.
  - 2. Signed by manufacturers certifying that products furnished comply with fire resistive requirements.
  - 3. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

#### 1.6 QUALITY ASSURANCE

- A. Fabricator/Installer:
  - 1. Provide custom casework, finishing and installation executed only by a custom casework fabricator/installer skilled and experienced in highest quality custom casework and which can furnish satisfactory evidence to the Architect as to recent installations of similar type and quality.
  - 2. The custom casework fabricator/installer is to have a minimum of 5 consecutive years experience in the type and quality of casework shown on the Drawings and specified herein.
  - 3. Shop is a certified participant in AWI's Quality Certification Program.
  - 4. Installer is a certified participant in AWI's Quality Certification Program.
- B. Reference Standards: Comply with the applicable provisions for grading and workmanship of the Architectural Woodwork Institute (AWI), latest standards, herein referred to as Standards, except as otherwise specified.
- C. Fire Test Response Characteristics: Where fire retardant materials or products are indicated or required by authorities having jurisdiction, provide materials and products with specified fire test response characteristics as determined by testing identical products per test method indicated by UL, ITS, or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify with appropriate markings of applicable testing and inspecting agency in the form of separable paper label or, where required by authorities having jurisdiction, imprint on surfaces of materials that will be concealed from view after installation.

#### 1.7 DELIVERY, STORAGE AND HANDLING

- A. Protect casework during transit, delivery, storage and handling to prevent damage, soiling and deterioration.

- B. Do not deliver casework until painting, wet work, grinding and similar operations which could damage, soil or deteriorate casework has been completed and the HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period in installation areas.
- C. If, due to unforeseen circumstances, casework must be stored in other than installation areas, store only in area which meet the requirements specified for installation areas.

#### 1.8 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Do not install casework until the required temperature and relative humidity have been stabilized in installation areas. Condition casework to average prevailing humidity and temperature conditions in installation areas prior to installing.
- B. Coordination:
  - 1. Coordinate design, fabrication and assembly of casework fabrications with other materials, elements, equipment and fabrications that are attached to, installed in, or are part of the completed installation.
  - 2. Verify dimensions and field conditions and review shop drawings of other trades, equipment and fabrications which attached to, in, or a part of the complete installation to assure proper fit, finish and function of the completed installation.
- C. Field Measurements: Where casework is indicated to be fitted to other construction, check actual dimensions of other construction by accurate field measurements before manufacturing casework; show recorded measurements on final shop drawings. Coordinate manufacturing schedule with construction progress to avoid delay of work.
  - 1. Where field measurements cannot be made without delaying the Work, guarantee dimensions and proceed with manufacture of casework without field measurements. Coordinate other construction to ensure that actual dimensions correspond to guaranteed dimensions.

### **PART 2 PRODUCTS**

#### 2.1 MATERIALS

- A. Plastic Laminate: Comply with requirements of Publication No. LD 3 by the National Electrical Manufacturers Association (NEMA) for General Purpose Type (HGS and VGS), nominal 0.048 inch thick and Postforming Type (HGP and VGP), nominal 0.038 inch thick, solid color laminates, Grade CC (Matte), nominal 0.034 inch thick. Colors, patterns and texture selected by the Architect with a maximum of 3 colors being utilized in the plastic laminate fabrications from samples of the following manufacturers:
  - 1. Formica Corporation, Cincinnati, OH 45241.
  - 2. Lamin-Art, Schaumburg, IL 60173.
  - 3. Nevamar, Panolam Industries, Shelton, CT 06484
  - 4. Pionite Decorative Surfaces, Auburn, ME 04210.
  - 5. Wilsonart LLC, Temple, Texas 76503.
  - 6. Abet Inc., Englewood, NJ 07631.

- B. Cabinet Liner: Plastic laminate manufacturer's standard products complying with CLS/-72.
- C. Thermoset Decorative Overlay Cabinet Liner: Surface of thermally fused, melamine impregnated decorative paper complying with LMA SAT-1 over specified medium density particleboard.
- D. Backing Sheet: Plastic laminate manufacturer's standard products complying with BKS/-91.
- E. Adhesives:
  - 1. Do not use adhesives that contain urea formaldehyde
  - 2. Fire Retardant Treated Materials: Resorcinol.
- F. Casework/Cabinet Construction Materials: Provide materials that comply with requirements of the Standards for each type of woodwork and quality grade indicated and, where the following products are part of woodwork, with requirements of the referenced product standards, that apply to product characteristics indicated:
  - 1. Hardboard: ANSI/AHA A135.4.
  - 2. Medium Density Particleboard: ANSI A208.1.
  - 3. Medium Density Fiberboard: ANSI A208.2, Grade MD.
  - 4. Medium Density Fiberboard: Industrial Grade Medium Density Fiberboard (MDF), manufactured with a formaldehyde-free adhesive system which meets the requirements of ANSI A208.2, Grade 150, as manufactured by one of the following:
    - a. Flakeboard Company Limited
    - b. McKillican International, Inc.
    - c. Sierrapine Ltd.
  - 5. Softwood Plywood: PS 1
  - 6. Medium Density Overlay: 3/4 inch thick plywood, APA Grade MDO.
  - 7. Internal Wood Framing and Blocking: Appearance Grade, 15 percent maximum moisture content, MC-15 or KD on grade stamp.
- G. Wall mounted shelf supports: Surface mounted Heavy-Duty pilaster type slotted steel standards and brackets as shown in drawings, minimum 16-ga BHMA Grade 2 Compliant. "KV 183 Series" (Knap & Vogt) or similar.
- H. Cabinet Hardware:
  - 1. Open Adjustable Shelf Supports:
    - a. Adjustable Shelf Supports: Heavy duty slotted steel, BHMA B84102.
      - 1) Garcy No. 649.
      - 2) Knap & Vogt No. 87.
      - 3) Capitol Hardware A-Line.
    - b. Caps: Provide manufacturer's standard caps at top and bottom of surface mounted standards which do not abut other surfaces.
  - 2. Flush Mounted Adjustable Pilaster Shelf Supports: Flush mounted pilaster type slotted steel standards, comply with BHMA B84072.
    - a. Garcy Nos. S373 and A73.
    - b. Knap & Vogt Nos. 255 and 239.
    - c. Capitol Hardware A-Line.
  - 3. Shelf Brackets: Provide heavy duty double and triple hooked steel brackets, BHMA B84112. Provide shelf rests.
    - a. Garcy Nos. 796 and M796.

- b. Knappe & Vogt No. 186 and 187.
  - c. Capitol Hardware A-Line.
- 4. Shelf End Support Clips: Steel supports with rubber cushions.
  - a. Garco No. FE286 & FE28
  - b. Capitol Hardware A-Line No. 77 & No. 109.
  - c. Knappe & Vogt No. 256R ZN.
- 5. Side Pair Drawer Slides: BHMA B85062, 75 lb. rated (per pair) ball-bearing nylon rollers, 1/2 inch wide units, commercial grade, full extension.
  - a. Grant No. 346.
  - b. Knappe & Vogt No. 1330.
  - c. Accuride C3832 Series.
- 6. Concealed Hinges: Recessed cup and pivot type, 110 degree swing, self-closing, built-in horizontal and vertical adjustment.
  - a. Blum No. BH73B3590.
  - b. Grass Tornos No. 160.
  - c. Hafele No. 345-47-665, Plate No. 349-32-646.
- 7. Aluminum Trims and Channel Reveals: Extruded aluminum accessories.
  - a. Basis of Design: Fry Reglet Corp.
  - b. Alternate Manufacturers:
    - 1) Gordon, Inc.
    - 2) Pittcon Industries.
  - c. Finish: Clear anodized.
  - d. Dimensions: As indicated.
  - e. Profiles: As selected by Architect.
- 8. Pulls: Solid brass, rod type, 5/16 inch diameter, 7/8 inch finger clearance, 4 inch screw centers, finish BHMA 626 satin chrome.
  - a. Colonial Bronze No. 753.
  - b. EPCO No. MC-4024.
  - c. Stanley No. 4483.
- 9. Recessed Pulls: Mockett DP156-SSS.
- 10. Magnetic Cabinet Catches: BHMA, B43142, B43152 or B43162 (type as applicable) aluminum case, commercial grade.
- 11. Heavy Duty Magnetic Catches: BHMA B43172, aluminum case, commercial grade, 11.0 lbs. minimum test pull (door 16 inch wide and wider).
- 12. Drawer and Cupboard Locks: Mortise type, 5-pin tumbler and dead bolt, round cylinder only exposed, brass with plated finish to match BHMA 626. Provide on each unit.
- 13. Countertop Wire Control Grommets: Plastic grommet with spring loaded cover, color selection by Architect to match counter plastic laminate, one of the following:
  - a. Doug Mockett & Co., Flip-Top, Manhattan Beach, CA 90266.
  - b. Hafele America, CO., No. 429.99.324 (black), Archdale, NC 27263.
  - c. Hardware Concepts, Inc., No. PL6200, Opa Locka, FL 33054.
- 14. Finish for Exposed Cabinet Hardware: Except as otherwise indicated, provide the following finish for exposed hardware: BHMA 626 satin chrome. For items not available in required finish, provide finish selected by Architect from those available. If more than one finish is indicated, match finish of hardware items on each set of casework as indicated.

## 2.2 FIRE RETARDANT TREATED MATERIALS

- A. General: Where indicated, use materials impregnated with fire retardant chemical formulations indicated by a pressure process or other means acceptable to authorities having jurisdiction to produce products with fire test response characteristics specified.
  - 1. Use treated material that complies with requirements of Standards. Do not use materials that are warped, discolored, or otherwise defective.
  - 2. Use fire retardant treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
  - 3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Fire Retardant Treated Lumber and Plywood by Non-Pressure Process: Apply nontoxic, water soluble, fire retardant treatment by dip, spray, roller, curtain coating, vacuum chamber, or soaking to achieve flame spread rating of 25 or less and smoke developed rating of 450 or less per ASTM E 84.
- C. Fire Retardant Treated Lumber and Plywood by Nonpressure Process: Apply nontoxic, water soluble, fire retardant treatment by dip, spray, roller, curtain coating, vacuum chamber, or soaking to achieve flame spread rating of 25 or less and smoke developed rating of 450 or less per ASTM E 84 and that contains no added urea formaldehyde.
- D. Fire Retardant Particleboard (For use with hardwood veneer): Panels complying with the following requirements, made from softwood particles, synthetic resins and fire retardant chemicals mixed together at time of panel manufacture to achieve flame spread rating of 25 or less and smoke developed rating of 200 or less per ASTM E 84 and that contains no added urea formaldehyde.
  - 1. For panels 3/4 inch thick and less, comply with ANSI A208.1-2009, Grade M-3 except for the following minimum properties: density, 45 lb/cu. ft; modulus of rupture, 1,600 psi; modulus of elasticity, 300,000 psi; internal bond, 80 psi; and screw holding capacity on face and edge, 250 lbf and 225 lbf, respectively.
  - 2. Products: Subject to compliance with requirements, provide one of the following:
    - a. "Duraflake FR" (Flakeboard Company Limited).
    - b. "Pyroblock Plus" (McKillican International, Inc.).
    - c. "Encore FR" (Sierrapine Ltd.).
- E. Fire Retardant Fiberboard (Do not use with hardwood veneer): Medium density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire retardant chemicals mixed together at time of panel manufacture to achieve flame spread rating of 25 or less and smoke developed rating of 200 or less per ASTM E 84 and that contains no added urea formaldehyde.
  - 1. Product: Subject to compliance with requirements, provide one of the following:
    - a. "Vesta FR" (Flakeboard Company Limited).
    - b. "Purekor" (McKillican International, Inc.).
    - c. "Medite FR" (Sierrapine Ltd.).

## 2.3 FABRICATION OF CASEWORK

- A. Examine conditions and verify dimensions at the project site. Fabrication and/or installation of the casework and related elements constitutes acceptance of the existing conditions.
- B. Not all details of casework are shown on the Drawings. The fabricator is to utilize the most advantageous manufacturing process to achieve the quality of casework indicated herein by the referenced Standards and the details shown on the Drawings.
- C. Plastic-Laminate-Clad Casework:
  - 1. Grade: AWI Premium Grade, Section 10, Type A construction, except as follows.
  - 2. Face Construction: Flush overlay type, except as otherwise indicated on the Drawings or specified herein (drawer front, doors and fixed panels conceal casework behind).
  - 3. Thickness and Style: As shown, or if not shown, provide minimum 3/4 inch thick medium density particleboard: counters, doors, drawer fronts and fixed panels, except where required to be thicker by standards or as shown on the Drawings; provide flush design units.
  - 4. Edges of Door, Drawers and Face Frame: Plastic laminate matching exposed surfaces. Ease exposed edges of overlap sheet.
  - 5. Backs of Doors: Plastic laminate matching exposed surfaces.
  - 6. Backs of Plastic Laminate Components (Except Doors): Provide full backer sheets.
- D. Counters:
  - 1. Counter Construction: 3/4 inch thick, phenolic resin sealed medium density particleboard compatible with laminate adhesives, with full backer sheets, as shown on Drawings, or if details not shown, comply with standards and provide 4 inch high backsplash and endsplash, top mounted square butt joints, fully covered with matching plastic laminate, eased edges.
  - 2. Exposed Counter Edges:
    - a. Plastic laminate matching surface, except as otherwise indicated. Ease exposed edges of overlap sheet.
    - b. Hardwood or veneer matching veneer surface, except as otherwise indicated. Ease exposed edges of overlap veneer.
    - c. When show on the Drawings, fabricate counters and counter edges using postforming plastic laminate to form rounded counter edges.
  - 3. Counter Splashes:
    - a. Fabricate counters with backsplashes and sidesplashes. Fabricate to thicknesses and heights shown on the Drawings. If not shown provide minimum 4 inch high x 3/4 inch thick backsplashes and sidesplashes with exposed surface covered with plastic laminate.
    - b. When show on the Drawings, fabricate counters and splashes using postforming plastic laminate to form integral counter splash cove.
  - 4. Openings:
    - a. Cut openings for equipment to be installed. Comply with equipment manufacturer's requirements, but provide internal corners of 1/8 inch minimum radius. Smooth saw cut and ease edges.
    - b. Seal cut edges of counter at openings for sinks and other wet equipment, using waterproofing compound recommended by plastic manufacturer and compatible with laminating adhesive.

- E. Shop fabricate casework to the greatest extent possible, disassemble only as necessary for delivery and installation.
- F. Install hardware at the shop prior to delivery. Remove hardware for finish application and reinstall after finishing.
- G. Fabricate with scribes to fit to abutting construction.

## **PART 3 EXECUTION**

### **3.1 PREPARATION**

- A. Verify measurements at the project site and provide any necessary closures and trim to fit the items to enclosing walls and construction. Provide other trades with information necessary for proper completion of related work. Installation of casework and related construction constitutes acceptance of the existing conditions.
- B. Condition casework to average prevailing humidity conditions in installation areas prior to installing.

### **3.2 INSTALLATION**

- A. Install architectural wood casework in compliance with Standards.
- B. Install plumb, level, true and straight with no distortions. Shim as required using concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches. Install with no more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.
- C. Where architectural wood casework abuts other finished work, scribe and cut for accurate fit. Before making cutouts, drill pilot holes at corners.
- D. Attach architectural wood casework securely in place with uniform joints providing for thermal and building movements. Secure to anchors or blocking built in or directly attached to substrates.
- E. Provide tops fabricated in largest sizes practical. Assemble in field with splines for alignment and drawn tight to hairline contact with tight joint fasteners.

### **3.3 ADJUSTING AND CLEANING**

- A. Repair damaged and defective architectural wood casework, where possible, to eliminate defects. Where not possible to repair, replace paneling. Adjust for uniform appearance.
- B. Clean architectural wood casework on exposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.



3.4 PROTECTION

- A. Protection: protect installed architectural wood casework, and finishes from damage. Maintain temperature/humidity conditions during the remainder of the construction period in areas of architectural wood casework installation.

**END OF SECTION**

## **SECTION 06 61 16**

### **SOLID SURFACE FABRICATIONS**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Solid surface fabrications, including but not limited to the following:
  - 1. Custom fabrications.
  - 2. Matching backsplash and trim.
  - 3. Fittings, hardware, anchors, and accessories to complete fabrication, assembly and installation.
- B. Related Sections:
  - 1. Metal fabrications: Section 05 50 00.
  - 2. Rough carpentry: Section 06 10 00.

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

- A. Product Data: manufacturer's fabrication, installation, and finishing instructions.
- B. Shop Drawings:
  - 1. Shop drawings for fabrication and installation of each item or assembly. Include location drawings for each item or assembly, dimensioned elevations and plans and large scale details.
  - 2. Show finish and edge treatments, hardware, anchors (size and spacing), support attachment and framing locations, and accessories. Indicate adjacent and supporting construction for each item and fabrication.
- C. Samples:
  - 1. Manufacturer's standard cast sheet acrylic samples not less than 6 inches x 6 inches for the total color range available including available finishes.
  - 2. Small amount of manufacturer's color matched sealant, for each color of sheet acrylic selected by the Architect.

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

- A. Manufacturer's maintenance instructions.

##### **1.4 QUALITY ASSURANCE**

- A. Fabricator's Qualifications: Provide cast sheet acrylic fabricated by a firm which has successfully fabricated items of similar quality and quantity of the product specified and as shown on the Drawings for a period of not less than 5 consecutive years. Fabricator to provide written evidence of such experience to the Architect upon request.

- B. Coordinate information necessary for proper installation and completion of the solid surface fabrication installations and related work.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Protect fabrications during transit, delivery, storage and handling to prevent damage, chipping, soiling and staining.
- B. Do not deliver fabrications until adjacent and supporting construction, ceramic tile installing, painting and wet work, grinding, sanding and similar operations has been completed in the installation areas.

### **PART 2 PRODUCTS**

#### 2.1 MATERIALS

- A. Solid Surface Sheet Acrylic: Cast, filled, acrylic; not coated panels, meeting ANSI Z124, Type Six and FS WW-P-541/GEN, 3/4 inch thick for counter and 1/2 inch thick for trim. Color selection by the Architect from manufacturer's standard colors with a maximum of 2 colors being utilized for fabrications. Provide one of the following:
  - 1. Products as indicated on the Drawings.
- B. Fusing and Laminating Material: Sheet acrylic panel manufacturer's standard fusing and laminating material.
- C. Sealant: Sheet acrylic panel manufacturer's standard silicone sealant color matched to counter material.

#### 2.2 ACCESSORIES

- A. Grommets for Cable Passage through Countertops:
  - 1. Basis of Design: Doug Mockett and Company.
  - 2. Color and Profile: As selected by Architect from manufacturer's full range of colors.
- B. Countertop Support Brackets: Steel, 18 by 24 inches, minimum 1,000 lb. load limit.
  - 1. Basis of Design: A & M Hardware, Inc.; Work Station Brackets.
  - 2. Provide manufacturer's standard factory-applied primer. Refer to Section 09 91 00 - Painting for finish coat.
  - 3. Paint to match wall panel or solid surface material.

#### 2.3 FABRICATION

- A. Examine conditions on the each fabrication and installation and verify dimensions at the project site prior to submittal of shop drawings. Fabrication of items constitutes acceptance of existing conditions.
- B. Not all details of the fabrications are shown on the Drawings, the fabricator is to utilize the most advantageous manufacturing and fabrication process in accordance with the manufacturer's printed fabrication instructions to achieve the highest quality of work. Fabricate specified items in accordance with the final reviewed shop drawings.

- C. Coordinate and receive templates for inserts, accessory cutouts, and mounting brackets, if any.
- D. Shop fabricate and finish solid surface fabrications using laminating to achieve thicknesses and edge detail shown or noted on the Drawings. Form and finish so that sheet joints are not visible. Finish edges to match face surfaces finish. Ease or chamfer exposed edges of fabrications as shown on the Drawings, if not shown provide 1/8 inch chamfers on edges.
- E. Provide protective wrapping for each fabricated item which will remain in place until completion of installation.

### **PART 3 EXECUTION**

#### **3.1 PREPARATION**

- A. Verify dimensions and conditions of the supporting construction at the project site prior to installing each fabricated item.
- B. Installation of the fabricated items constitutes acceptance of the existing conditions.

#### **3.2 INSTALLATION**

- A. Install fabrications and accessories plumb, level, true and straight with no distortions. Install fabrications in accordance with the final reviewed shop drawings.
  - 1. Shim as required using concealed plastic shims.
  - 2. Scribe fabrications, counters, aprons and splashes to adjacent finishes and construction.
- B. Form field joints using manufacturer's recommended adhesive, with joints inconspicuous in the finished work.
- C. Anchor fabrications to the supporting construction or framework in accordance with the final reviewed shop drawings using screws, bolts and anchors of the type, size and spacing as determined by the fabricator for the conditions present.
- D. Adhere and seal joints of solid surface fabrications using manufacturer's recommended adhesives and sealants. Match color of sealant to that of countertop.
- E. Adhere solid surface fabrications to substrates using manufacturer's color matched silicone sealant. Seal top and side edges of solid surface fabrications where they abut other finish construction and tool sealant to neat consistent appearance.
- F. Touch-up finish surfaces of minor scratches, dirt, stains and damage by sanding and finishing in accordance with the manufacturer's printed instructions. Finish and blend damaged areas with adjoining surfaces. Remove and replace any fabrication that cannot be successfully repaired or refinished.

#### **3.3 PROTECTION AND CLEANING**

- A. Protect materials and finishes from damage by other work until final acceptance of the work by the Owner. Maintain shop installed protective coverings until just prior to final acceptance and cleaning.

- B. Remove protective coverings and adhesive and clean fabrications using cleaning materials and methods recommended by the sheet acrylic panel manufacturer.
- C. Repair and refinish or remove and replace defective work that cannot be repaired upon completion of the installation.

**END OF SECTION**

**SECTION 07 21 00**  
**BUILDING THERMAL INSULATION**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Building thermal insulation, including the following:
  - 1. Faced and unfaced blanket insulation.
  - 2. Accessories and incidental materials required for installation of the above.
- B. Related Sections:
  - 1. Joint sealants: Section 07 92 00.
  - 2. Glazing: Section 08 80 00.

**1.2 ACTION SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Samples:
  - 1. 6 inch x 6 inch pieces of each type insulation.
  - 2. Typical fastener, if used.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's installation instructions for placement, seaming, penetration prevention and repair, and perimeter seal of vapor barrier per ASTM E1643.

**1.4 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.
- C. Formaldehyde Free: Provide formaldehyde free products.
- D. Recycled Content: Provide glass and rock wool fiber insulation with recycled content so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 10 percent.

1.5 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.

**PART 2 PRODUCTS**

2.1 MANUFACTURERS

- A. In other Part 2 articles where titles below introduce lists, the following requirements apply to product selection:
1. Products: Subject to compliance with requirements, provide one of the products specified.
- B. Acceptable Manufacturers:
1. Diversifoam Products, Rockford, MN 55373.
  2. The Dow Chemical Co., Midland MI 48674.
  3. Owens-Corning, Parsippany, NJ 07054.
  4. Johns Manville, Denver, CO 80217.
  5. CertainTeed (A subsidiary of Saint-Gobain), Malvern, PA 19355.
  6. Rock Wool Manufacturing, Leeds, AL 35094.
  7. Rockwool International A/S, Milton, Ontario, Canada L9T 6W3.
  8. Thermafiber, Inc. (an Owens Corning company), Wabash, IN 46992.
  9. Knauf Insulation, Shelbyville, IN 46176.

2.2 BATT (BLANKET) INSULATION

- A. Mineral Wool Fiber:
1. Exterior Wall and Soffit Insulation: Blankets of rock or slag faced on one side with foil reinforced vapor retarder conforming with ASTM C 665, Type III, thickness as shown on Drawings.
    - a. "Roxul, AFB batts" (Rockwool).
    - b. "UltraBatt" (Thermafiber).
  2. Miscellaneous Exterior Building Voids: Blankets of rock or slag unfaced conforming with ASTM C 665 Type I, thickness as shown on Drawings.
    - a. "UltraBatt" (Thermafiber).
    - b. "Roxul, AFB batts" (Rockwool).
    - c. "Min Wool" (Industrial Insulation Group, Johns Manville).

2.3 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. Products:
    - a. "Series T TACTOO Insul-Hangers" (AGM Industries, Inc.).
    - b. "Stic-Klip Type N fasteners" (Eckel Industries of Canada).
    - c. "Spindle Type" (Gemco).

2. Plate: Perforated galvanized carbon steel sheet, 0.030 inch thick by 2 inches square.
  3. Spindle: Copper coated, low carbon steel; fully annealed; 0.105 inch in diameter; length to suit depth of insulation indicated.
- B. Insulation Retaining Washers: Self-locking washers formed from 0.016 inch 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 square or in diameter.
1. Products:
    - a. "RC150" (AGM Industries, Inc.).
    - b. "SC150" (AGM Industries, Inc.).
    - c. "Dome-Cap" (Gemco).
    - d. "R-150" (Gemco).
    - e. "S-150" (Gemco).
- C. Insulation Standoff: Spacer fabricated from galvanized mild steel sheet for fitting over spindle of insulation anchor to maintain air space of 1 inch between face of insulation and substrate to which anchor is attached.
1. Product: "Clutch Clip" (Gemco).
- D. Anchor Adhesive: Product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.
1. Products:
    - a. "TACTOO Adhesive" (AGM Industries, Inc.).
    - b. "Stic-Klip Type S Adhesive" (Eckel Industries of Canada).
    - c. "Tuff Bond Hanger Adhesive" (Gemco).

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for 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, including removing projections capable of interfering with insulation attachment.

#### **3.3 INSTALLATION - GENERAL**

- A. Comply with insulation manufacturer's written instructions applicable to products and application indicated.
- B. 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.



- C. 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.
- D. 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 mechanical anchorage to provide permanent placement and support of units.
- B. Blanket: Install batt 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 clearance of insulation around recessed lighting fixtures.
  - 4. For metal-framed wall cavities where cavity heights exceed 96 inches, support unfaced blankets mechanically by wire or strapping space not more than 2 feet on center and support faced blankets by taping flanges of insulation to flanges of metal studs.

### 3.5 PROTECTION

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

## **END OF SECTION**

## **SECTION 07 84 13**

### **PENETRATION FIRESTOPPING**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Penetration firestopping, including but not limited to the following:
  - 1. Penetrations in fire-resistance-rated horizontal assemblies.
  - 2. Penetrations in fire-resistance-rated walls and partitions.
  - 3. Penetrations in smoke barriers.

##### **1.2 PERFORMANCE REQUIREMENTS**

- A. Penetration Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.
- B. Fire-Test-Response Characteristics:
  - 1. Perform penetration firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
  - 2. Test per testing standards referenced in "Penetration Firestopping Systems" Article. Provide rated systems complying with the following requirements:
    - a. Penetration firestopping systems shall bear classification marking of a qualified testing agency.
      - 1) UL in its "Fire Resistance Directory."
      - 2) Intertek Group in its "Directory of Listed Building Products."
      - 3) FM Approvals in its "Building Materials Approval Guide."
- C. For penetration firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
  - 1. For piping penetrations for plumbing and wet-pipe sprinkler systems, provide moisture-resistant penetration firestopping.
  - 2. For floor penetrations with annular spaces exceeding 4 inches or more in width and exposed to possible loading and traffic, provide penetration firestopping capable of supporting the floor loads involved either by installing floor plates or by other means.
  - 3. For penetrations involving insulated piping, provide penetration firestopping not requiring removal of insulation.
- D. For penetration firestopping exposed to view, provide products with flame-spread values of less than 25 and smoke-developed values of less than 450, as determined per ASTM E 84.
- E. Systems and Product Selection:

1. Unless otherwise indicated on the Drawings, select systems and products which are appropriate for the types of penetrations, construction systems and the required fire resistance ratings shown on the Drawings and which comply with the requirements of this specification.
2. Proprietary products and UL designs when indicated on the Drawings are not intended to imply that products and UL designs of the manufacturer are required to the exclusion of equivalent products of other named acceptable manufacturers.

### 1.3 ADMINISTRATIVE REQUIREMENTS

- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping systems.
- C. Pre-installation Meeting: Meet with Installer, Architect, firestopping manufacturer's technical representative, if so requested, and other trades involved in coordination with firestopping work at the Project Site. Review procedures and time schedule proposed for installation of penetration firestopping in coordination with other work. Review each major penetration firestopping application required on the Project.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Schedule: For each type of penetration and construction submit a schedule indicating the following:
  1. Location, illustration of firestopping system, and design designation of qualified testing and inspecting agency.
  2. Engineering Judgments: Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping system, submit illustration, with modifications marked, approved by penetration firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly. Obtain approval of authorities having jurisdiction prior to submittal.
- C. Samples: Submit manufacturer's standard color samples for selection by Architect for exposed to view penetration firestopping.

### 1.5 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Literature: Materials description and installation instructions/specifications for materials used in the system.
- B. Certification by penetration firestopping manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs) and are nontoxic to building occupants.
- C. Product Certificates: Signed by manufacturers of penetration firestopping products certifying that their products comply with specified requirements.

- D. Product Test Reports: From a qualified testing and inspecting agency indicating compliance penetration firestopping complies with requirements based on comprehensive testing of current products.
- E. Installer Qualifications:
  - 1. Submit written evidence in accordance with the "Quality Assurance" article to demonstrate capabilities and experience. Include list of completed projects with project names, addresses, names of Architect and Owners, and other information specified.
  - 2. Installer's written certification from the Manufacturer stating that the Installer is approved and is a Certified or Licensed Installer of the proposed penetration firestopping.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with its "Qualified Firestop Contractor Program Requirements."
- B. Single-Source Responsibility: Obtain penetration firestopping for each type of penetration and construction condition indicated from a single manufacturer.

#### 1.7 TESTING SERVICES

- A. The Owner will employ and pay a qualified inspection agency to test and inspect installed penetration firestopping for compliance with requirements.

#### 1.8 DELIVERY, STORAGE AND HANDLING

- A. Deliver penetration firestopping products to Project site in original, unopened containers or packages with intact and legible manufacturers' labels identifying product and manufacturer; date of manufacture; lot number; shelf life, if applicable; qualified testing and inspecting agency's classification marking applicable to Project; curing time; and mixing instructions for multi component materials.
- B. Store and handle penetration firestopping materials to prevent their deterioration or damage due to moisture, temperature changes, contaminants, or other causes.
  - 1. Store materials, between 60 deg F and 80 deg F. If exposed to lower temperature, restore to proper temperature before using.
  - 2. Store materials, in dry area and protect. Replace damaged materials at Contractor's expense.

#### 1.9 PROJECT/SITE CONDITIONS

- A. Environmental Conditions:
  - 1. Do not proceed with installation of penetration firestopping under adverse environmental conditions or when temperatures are outside the manufacturer's recommended limits.

2. Proceed with the Work only when forecasted environmental conditions are favorable for proper cure and development by ambient temperature variations, install elastomeric sealants only when temperatures are in the lower third of manufacturer's recommended installation temperature range, so that sealant will not be subjected to excessive elongation and bond stress at subsequent low temperatures.
  - B. Ventilation: Ventilate penetration firestopping installation area per penetration firestopping manufacturers' instructions by natural means or, where this is inadequate, forced air circulation.
- 1.10 COORDINATION
- A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping are installed according to specified requirements.
  - B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.
  - C. Notify Owner's inspecting agency at least seven days in advance of penetration firestopping installations; confirm dates and times on days preceding each series of installations.
  - D. Do not cover up penetration firestopping installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

## **PART 2 PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the specified requirements, provide systems products by one of the following:
  1. 3M Fire Protection Products, St. Paul, MN 55144
  2. Hilti Construction Chemicals, Inc., Tulsa, OK 74146
  3. The RectorSeal Corporation, Houston, TX 77023
  4. United States Gypsum Co., Chicago. IL 60680
  5. Specified Technologies Co., Sommerville, Nj 08876
  6. A/D Fire Protection Systems Inc., Scarborough, ON M1B 1Y4.
  7. NUCO Industries, Lake Forest, IL 60045
  8. Tremco; Cleveland, OH 44104

### **2.2 PENETRATION FIRESTOPPING - GENERAL**

- A. Compatibility: Provide penetration firestopping that are compatible with one another, with the substrates forming openings, and with the items, if any, penetrating penetration firestopping, under conditions of service and application, as demonstrated by penetration firestopping manufacturer based on testing and field experience.

- B. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
  - 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- C. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
  - 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
  - 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
  - 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- D. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg.
  - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. of penetration opening at and no more than 50-cfm cumulative total for any 100 sq. ft. at both ambient and elevated temperatures.
- E. Accessories: Provide components for each penetration firestopping that is needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by the penetration firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems. Provide accessories which include but are not limited to the following items:
  - 1. Permanent forming/damming/backing materials.
  - 2. Substrate primers.
  - 3. Collars.
  - 4. Steel sleeves.

## 2.3 FILL MATERIALS

- A. General: Provide penetration firestopping containing the types of fill materials indicated in the Penetration firestopping Schedule at the end of Part 3 by reference to the types of materials described in this Article. Fill materials are those referred to in directories of the referenced testing and inspecting agencies as fill, void, or cavity materials.
- B. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer sleeve lined with an intumescent strip, a flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.
- C. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.
- D. Firestop Devices: Factory-assembled collars formed from galvanized steel and lined with intumescent material sized to fit specific diameter of penetrant.

- E. Intumescent Composite Sheets: Rigid panels consisting of aluminum-foil-faced intumescent elastomeric sheet bonded to galvanized steel sheet.
- F. Intumescent Putties: Non-hardening dielectric, water-resistant, intumescent, putties containing no solvents, inorganic fibers, or silicone compounds.
- G. Intumescent Wrap Strips: Single-component intumescent elastomeric sheets with aluminum foil on one side.
- H. Mortars: Prepackaged, dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a non-shrinking, homogeneous mortar.
- I. Pillows/Bags: Reusable, heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.
- J. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, non-shrinking foam.
- K. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants.

## 2.4 MIXING

- A. For those products requiring mixing before application, comply with penetration firestopping manufacturer's written instructions for accurate proportioning of materials, water (if required), type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other items or procedures needed to produce products of uniform quality with optimum performance characteristics for application indicated.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of penetration firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Application or installation of material constitutes acceptance of the substrate.

## 3.2 PREPARATION

- A. Surface Cleaning: Clean out openings and joints immediately prior to installing penetration firestopping to comply with recommendations of penetration firestopping manufacturer and the following requirements:
  - 1. Remove foreign materials from surfaces of opening and joint substrates and from penetrating items that could interfere with adhesion of penetration firestopping materials.

2. Clean opening and joint substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping materials. Remove loose particles remaining from cleaning operation.
  3. Remove laitance and form release agents from concrete.
- B. Priming: Prime substrates where recommended by penetration firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Masking Tape: Use masking tape to prevent penetration firestopping materials from contacting adjoining surfaces that will remain exposed upon completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from penetration firestopping materials. Remove tape as soon as it is possible to do so without disturbing penetration firestopping's seal with substrates.

### 3.3 INSTALLATION

- A. General: Comply with the penetration firestopping manufacturer's installation instructions and drawings pertaining to products and applications indicated.
- B. Install forming/damming/backing materials and other accessories of types required to support fill materials during their application and in the position needed to produce the cross-sectional shapes and depths required to achieve fire ratings of designated penetration firestopping.
1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not forming permanent components of firestop systems.
- C. Install fill materials for penetration firestopping by proven techniques to produce the following results:
1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items.
  2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.
  3. For fill materials that will remain exposed after completing Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

### 3.4 FIELD QUALITY CONTROL

- A. Owner will engage a qualified testing agency to perform tests and inspections according to ASTM E 2174.
- B. Where deficiencies are found or penetration firestopping system is damaged or removed because of testing, repair or replace penetration firestopping system to comply with requirements.
- C. Proceed with enclosing penetration firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.



### 3.5 IDENTIFICATION

- A. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches high and with minimum 0.375-inch strokes.
  - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet from end of wall and at intervals not exceeding 30 feet.
- B. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  - 1. The words: "Warning--Penetration Firestopping--Do Not Disturb. Notify Building Management of Any Damage."
  - 2. Contractor's name, address, and phone number.
  - 3. Penetration firestopping designation of applicable testing and inspecting agency.
  - 4. Date of installation.
  - 5. Penetration firestopping manufacturer's name.
  - 6. Installer's name.

### 3.6 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to openings as Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure penetration firestopping are without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated penetration firestopping immediately and install new materials to produce penetration firestopping complying with specified requirements.

### 3.7 PENETRATION FIRESTOPPING SCHEDULE

- A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.
- B. Penetration Firestopping Systems with No Penetrating Items: Comply with the following:
  - 1. Available UL-Classified Systems: C-AJ- 0001-0999.
- C. Penetration Firestopping Systems for Metallic Pipes, Conduit, or Tubing: Comply with the following:
  - 1. Available UL-Classified Systems: C-AJ- 1001-1999.
- D. Penetration Firestopping Systems for Metallic Pipes, Conduit, or Tubing in Framed Walls: Comply with the following:
  - 1. Available UL-Classified Systems: W-L- 1001-1999.

- E. Penetration Firestopping Systems for Nonmetallic Pipe, Conduit, or Tubing: Comply with the following:
  - 1. Available UL-Classified Systems: C-AJ-2001-2999.
- F. Penetration Firestopping Systems for Electrical Cables : Comply with the following:
  - 1. Available UL-Classified Systems: C-AJ- 3001-3999.
- G. Penetration Firestopping Systems for Cable Trays: Comply with the following:
  - 1. Available UL-Classified Systems: C-AJ-4001-4999.
- H. Penetration Firestopping Systems for Insulated Pipes: Comply with the following:
  - 1. Available UL-Classified Systems: C-AJ-5001-5999.
- I. Penetration Firestopping Systems for Insulated Pipes in Framed Walls: Comply with the following:
  - 1. Available UL-Classified Systems: W-L-5001-5999.
- J. Penetration Firestopping Systems for Miscellaneous Electrical Penetrants: Comply with the following:
  - 1. Available UL-Classified Systems: C-AJ-6001-6999.
- K. Penetration Firestopping Systems for Miscellaneous Electrical Penetrants in Framed Walls: Comply with the following:
  - 1. Available UL-Classified Systems: W-L-6001-6999.
- L. Penetration Firestopping Systems for Miscellaneous Mechanical Penetrations: Comply with the following:
  - 1. Available UL-Classified Systems: C-AJ- 7001-7999.
- M. Penetration Firestopping Systems for Miscellaneous Mechanical Penetrations in Framed Walls: Comply with the following:
  - 1. Available UL-Classified Systems: W-L- 7001-7999.
- N. Penetration Firestopping Systems for Groupings of Penetrations: Comply with the following:
  - 1. Available UL-Classified Systems: C-AJ-8001-8999.
- O. Penetration Firestopping Systems for Groupings of Penetrations in Framed Walls: Comply with the following:
  - 1. Available UL-Classified Systems: W-L-8001-8999.

**END OF SECTION**

## **SECTION 07 84 43**

### **JOINT FIRESTOPPING**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Joint firestopping, including but not limited to the following:
  - 1. Joints in or between fire-resistance-rated constructions.
  - 2. Joints at exterior wall/floor intersections.
  - 3. Joints in smoke barriers.

##### **1.2 PERFORMANCE REQUIREMENTS**

- A. Joint Firestopping Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which joint firestopping systems are installed. Joint firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Fire-Test-Response Characteristics:
  - 1. Perform joint firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
  - 2. Test per testing standards referenced in "Joint Firestopping Systems" Article. Provide rated systems complying with the following requirements:
    - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
      - 1) UL in its "Fire Resistance Directory."
      - 2) Intertek Group in its "Directory of Listed Building Products."
- C. System and Product Selection: Unless otherwise indicated on the Drawings, select systems and products which are appropriate for the types of penetrations, construction systems and the required fire ratings as shown on the Drawings, complying with the requirements of this specification.
  - 1. ADMINISTRATIVE REQUIREMENTS
- D. Pre-installation Meeting: Meet with Installer, Architect, firestopping manufacturer's technical representative, if so requested, and other trades involved in coordination with firestopping work at the Project Site. Review procedures and time schedule proposed for installation of joint firestopping in coordination with other work. Review each major joint firestopping application required on the Project.

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

- A. Product Data: For each type of product indicated.
- B. Product Schedule: For each joint firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.

1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular joint firestopping system condition, submit illustration, with modifications marked, approved by joint firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: For each type of joint firestopping, signed by product manufacturer.
- C. Product Test Reports: For each joint firestopping system, for tests performed by a qualified testing agency.

#### 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain joint firestopping for each kind of joint and construction condition indicated through one source from a single manufacturer.
- B. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver joint firestopping products to Project site in original, unopened containers or packages with qualified testing and inspecting agency's classification marking applicable to Project and with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, lot number, shelf life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials for joint firestopping to prevent deterioration or damage due to moisture, temperature changes, contaminants, or other causes.

#### 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install joint firestopping when ambient or substrate temperatures are outside limits permitted by joint firestopping manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Ventilate joint firestopping per manufacturer's written instructions by natural means or, if this is inadequate, forced-air circulation.

#### 1.8 COORDINATION

- A. Coordinate construction of joints to ensure that joint firestopping is installed according to specified requirements.
- B. Coordinate sizing of joints to accommodate joint firestopping.

- C. Notify Owner's inspecting agency at least seven days in advance of joint firestopping installations; confirm dates and times on days preceding each series of installations.
- D. Do not cover up joint firestopping installations that will become concealed behind other construction until Owner's inspecting agency and building inspector, if required by authorities having jurisdiction, have examined each installation.

## **PART 2 PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with the specified requirements, provide system products by one of the following:
  - 1. Joint firestopping:
    - a. 3M Fire Protection Products, St. Paul, MN 55144.
    - b. Hilti Construction Chemicals, Inc., Tulsa, OK 74146.
    - c. The RectorSeal Corporation, Houston, TX 77023.
    - d. Nelson Firestop Products, a brand of Emerson Industrial Automation, Tulsa, OK 74145.
    - e. Specified Technologies Co., Sommerville, NJ 08876.
    - f. NUCO Industries, Lake Forest, IL 60045.
    - g. Thermafiber, Inc., an Owens Corning company, Wabash, IN 46992.
    - h. Tremco; Cleveland, OH 44104.
    - i. ROXUL Inc.
    - j. A/D Fire Protection Systems Inc.

### **2.2 JOINT FIRESTOPPING SYSTEMS**

- A. Compatibility: Provide joint firestopping that is compatible with joint substrates, under conditions of service and application, as demonstrated by joint firestopping manufacturer based on testing and field experience.
- B. Joints in or between Fire-Resistance-Rated Construction: Provide joint firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
  - 1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- C. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E 2307.
  - 1. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
- D. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg.
  - 1. L-Rating: Not exceeding 5.0 cfm/ft. of joint at both ambient and elevated temperatures.
- E. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

- F. Accessories: Provide components of joint firestopping, including primers and forming materials, that are needed to install fill materials and to comply with "Performance Requirements" Article. Use only components specified by joint firestopping manufacturer and approved by the qualified testing and inspecting agency for conditions indicated.

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Application or installation of material constitutes acceptance of the substrate.

### **3.2 PREPARATION**

- A. Surface Cleaning: Clean joints immediately before installing joint firestopping to comply with joint firestopping manufacturer's written instructions and the following requirements:
  - 1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
  - 2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by joint firestopping manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.
- C. Use masking tape to prevent fill materials of joint firestopping from contacting adjoining surfaces that will remain exposed on completion of Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove smears from joint firestopping materials. Remove tape as soon as possible without disturbing joint firestopping's seal with substrates.

### **3.3 INSTALLATION**

- A. General: Install joint firestopping to comply with Performance Requirements and joint firestopping manufacturer's written installation instructions.
- B. Install forming materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.
  - 1. After installing elastomeric fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

- C. Install fill materials for joint firestopping systems by proven techniques to produce the following results:
  - 1. Fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
  - 2. Apply fill materials so they contact and adhere to substrates formed by joints.
  - 3. For fill materials that will remain exposed after completing Work, tool sealants to form smooth, uniform surface of flush configuration.
  - 4. IDENTIFICATION
- D. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  - 1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
  - 2. Contractor's name, address, and phone number.
  - 3. Designation of applicable testing agency.
  - 4. Date of installation.
  - 5. Manufacturer's name.
  - 6. Installer's name.

### 3.4 CLEANING AND PROTECTION

- A. Clean off excess fill materials adjacent to joints as Work progresses by methods and with cleaning materials that are approved in writing by joint firestopping manufacturers and that do not damage materials in which openings occur.
- B. Provide final protection and maintain conditions during and after installation that ensure joint firestopping is without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated joint firestopping immediately and install new materials to produce joint firestopping complying with specified requirements.
  - 1. JOINT FIRESTOPPING SYSTEM SCHEDULE
- C. Where UL-classified joint firestopping systems are indicated, they refer to alphanumeric designations listed in UL's "Fire Resistance Directory" under product Category XHBN or Category XHDG.
- D. Where Intertek Group-listed systems are indicated, they refer to design numbers in Intertek Group's "Directory of Listed Building Products" under product category Expansion/Seismic Joints or Firestop Systems.
- E. Where UL-classified joints at exterior curtain-wall/floor intersections are indicated, they refer to alphanumeric designations listed in UL's "Fire Resistance Directory" under product Category XHDG.
- F. Floor-to-Floor, Joint Firestopping System:
  - 1. UL-Classified Products:
    - a. Movement: FF-D-0999
    - b. No Movement: FF-S-0999

2. Assembly Rating: 1 hour / 2 hours
  3. Nominal Joint Width: As indicated on Drawings, if not indicated, provide joint width not more than 1/2 inch.
  4. Movement Capabilities: Class II
- G. Floor-to-Wall, Joint Firestopping System:
1. UL-Classified Products:
    - a. Movement: FW-D-0999
    - b. No Movement: FW-S-0999
  2. Assembly Rating: 1 hour / 2 hours
  3. Nominal Joint Width: As indicated on the Drawings, if not indicated, provide joint width not more than 1/2 inch.
  4. Movement Capabilities: Class II
- H. Head-of-Wall, Joint Firestopping System:
1. UL-Classified Products:
    - a. Movement: HW-D-0999
    - b. No Movement: HW-S-0999
  2. Assembly Rating: 1 hour / 2 hours
  3. Nominal Joint Width: As indicated on the Drawings, if not indicated, provide joint width not more than 1 inch.
  4. Movement Capabilities: Class II
- I. Wall-to-Wall, Joint Firestopping System:
1. UL-Classified Products:
    - a. Movement: WW-D-0999
    - b. No Movement: WW-S-0999
  2. Assembly Rating: 1 hour / 2 hours
  3. Nominal Joint Width: As indicated on the Drawings, if not indicated, provide joint width not more than 1/2 inch.
  4. Movement Capabilities: Class II
- J. Bottom-of-Wall, Joint Firestopping System:
1. UL-Classified Products:
    - a. Movement: BW-D-0999
    - b. No Movement: BW-S-0999
  2. Assembly Rating: 1 hour / 2 hours
  3. Nominal Joint Width: As indicated on the Drawings, if not indicated, provide joint width not more than 1 inch.
  4. Movement Capabilities: Class II
- K. Perimeter Joint Firestopping System:
1. UL-Classified Products:
    - a. No Movement: CW-S-2001
    - b. Movement: CW-D-XXXX
  2. Integrity Rating: 1 hour
  3. Insulation Rating: 3/4



4. Linear Opening Width: As indicated on the Drawings, if not indicated, provide joint width not more than 2-1/2 inches.

**END OF SECTION**

## **SECTION 07 92 00**

### **JOINT SEALANTS**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Joint sealants and installation accessories, including the following:
  - 1. Silicone joint sealants.
  - 2. Urethane joint sealants.
  - 3. Latex joint sealants.
  - 4. Preformed joint sealants.
  - 5. Acoustical joint sealants.
  - 6. Specialty sealants for garage floor slabs.
  - 7. Installation accessories and materials for the above.

##### **1.2 PRECONSTRUCTION TESTING**

- A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
  - 1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
  - 2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.
  - 3. Stain Testing: Use ASTM C 1248 to determine stain potential of sealant when in contact with stone or masonry substrates.
  - 4. Submit not fewer than 8 pieces of each kind of material, including joint substrates, shims, joint sealant backings, secondary seals, and miscellaneous materials.
  - 5. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  - 6. For materials failing tests, obtain joint sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
  - 7. Testing will not be required if joint sealant manufacturers submit data that are based on previous testing, not older than 24 months, of sealant products for adhesion to, staining of, and compatibility with, joint substrates and other materials matching those submitted.
- B. Preconstruction Field Adhesion Testing: Before installing sealants, field test their adhesion to project joint substrates as follows:
  - 1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
  - 2. Conduct field tests for each kind of sealant and joint substrate.

3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint sealant manufacturer's technical representative present.
  - a. Test Method: Test joint sealants according to ASTM C 1193, Appendix X1, Method A - Field-Applied Sealant Joint Hand Pull Tab, or ASTM C 1521, Method A - Tail Procedure.
    - 1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

### 1.3 PREINSTALLATION MEETINGS

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

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.
- B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.
- C. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2 inch wide joints formed between two 6 inch long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.
- D. Joint Sealant Schedule: Include the following information:
  1. Joint sealant application, joint location, and designation.
  2. Joint sealant manufacturer and product name.
  3. Joint sealant formulation.
  4. Joint sealant color.

### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified testing agency.
- B. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.
- C. Preconstruction Laboratory Test Schedule: Include the following information for each joint sealant and substrate material to be tested:
  1. Joint-sealant location and designation.
  2. Manufacturer and product name.
  3. Type of substrate material.

4. Proposed test.
5. Number of samples required.
- D. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- E. Preconstruction Laboratory Reports: From sealant manufacturer, indicating the following:
  1. Materials forming joint substrates and joint sealant backings have been tested for compatibility and adhesion with joint sealants.
  2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- F. Preconstruction Field Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.
- G. Field Adhesion Test Reports: For each sealant application tested.
- H. Warranties: Sample of special warranties.

#### 1.6 QUALITY ASSURANCE

- A. Comply with the applicable portions of ASTM C 1193 - Standard Guide for Use of Joint Sealants for use of joint sealants as applicable to materials, applications, and conditions indicated.
- B. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint sealant installations with a record of successful in-service performance.
- C. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- D. Product Testing: Test joint sealants using a qualified testing agency.
  1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
  2. Test according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.
- E. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

#### 1.7 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
  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.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS, GENERAL**

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40CFR59, Part 59, Subpart D (EPA Method 24):
  1. Architectural Sealants: 250 g/L.
  2. Sealant Primers for Nonporous Substrates: 250 g/L.
  3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Stain Test Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- D. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

### **2.2 JOINT SEALANTS**

- A. S-2: Single Component, Nonsag Urethane Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT. Subject to compliance with requirements, provide one of the following:
  1. "Dynatrol I-XL" (Pecora Corporation).
  2. "Sikaflex - 1a" (Sika Corporation, Construction Products Division).
  3. "Dymonic and Vulkem 116" (Tremco Incorporated).
  4. "Masterseal NP1" (BASF).
- B. S-3: Multicomponent, Nonsag Urethane Joint Sealant: ASTM C 920, Type M, Grade NS, Class 25, for Use T. Subject to compliance with requirements, provide one of the following:
  1. "Dynatred" (Pecora Corporation).
  2. "Sikaflex - 2c NS" (Sika Corporation, Construction Products Division).
  3. "Masterseal NP2" (BASF).
  4. "Vulkem 227" (Tremco Incorporated).
- C. S-4: Acrylic Latex or Siliconized Acrylic Latex Joint Sealant: ASTM C 834, Type OP, Grade NF. Subject to compliance with requirements, provide one of the following:
  1. "AC-20+" (Pecora Corporation).
  2. "Tremflex 834" (Tremco Incorporated).
  3. "Masterseal 520" (BASF).

- D. S-5: Single Component, Nonsag Neutral Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT. Subject to compliance with requirements, provide one of the following:
  - 1. "790" (Dow Corning Corporation).
  - 2. "SilPruf LM SCS2700" (GE Advanced Materials – Silicones).
  - 3. "Spectrem 1" (Tremco Incorporated).
  - 4. "890NST" (Pecora Corporation).
- E. S-6: Single Component, Nonsag Neutral Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 50/50, for Use NT and nonstaining to porous substrates per ASTM C 1248. Subject to compliance with requirements, provide one of the following:
  - 1. "Spectrem 3" (Tremco, Inc.).
  - 2. "756 SMS" (Dow Corning Corporation).
  - 3. "SCS9000 SilPruf NB" (GE Construction Sealants).
  - 4. "864NST", "895NST", or "898NST" (Pecora Corporation).
- F. S-7: Single Component, Nonsag, Neutral Curing Silicone Joint and Structural Glazing Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT. Subject to compliance with requirements, provide one of the following:
  - 1. "799" (Dow Corning Corporation).
  - 2. "UltraGlaze SSG4000" (GE Advanced Materials – Silicones).
  - 3. "Proglaze SSG" (Tremco Incorporated).
- G. S-8: Mildew Resistant, Single Component, Acid Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT. Subject to compliance with requirements, provide one of the following:
  - 1. "786 Mildew Resistant" (Dow Corning Corporation).
  - 2. "Sanitary SCS1700" (GE Advanced Materials – Silicones).
  - 3. "Tremsil 200 Sanitary" (Tremco Incorporated).
  - 4. "898NST" (Pecora Corporation).
- H. S-9: Butyl sealant: material with a movement capability of plus or minus 5 percent, conforming to ASTM C 1085.
  - 1. "Butyl Rubber Sealant BC-158" (Pecora Corp.).
  - 2. "PTI 757" (H. B. Fuller Company).
  - 3. "Tremco Butyl Sealant" (Tremco, Inc.).
- I. S-10: Polyurea Joint Sealant: Two-part, fast setting, self-leveling, 100 percent solids, semi-rigid, for sealing parking garage floor slab, saw-cut, construction and control joints:
  - 1. "Euco QWIK Joint 200" (Euclid).
  - 2. "Masterseal CR 100" (BASF).
- J. S-11: Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings in building construction as demonstrated by testing representative assemblies according to ASTM E90. Subject to compliance with requirements, provide one of the following:
  - 1. "AC-20 FTR or AIS-919" (Pecora Corporation).
  - 2. "SHEETROCK Acoustical Sealant" (USG Corporation).
  - 3. "Acoustical Sealant" (Tremco, Inc.).

- K. Acoustical Sealant for Fire Rated Partitions: refer to Section 07 84 43 Joint Firestopping.

## 2.3 PREFORMED JOINT SEALANTS

- A. Preformed Silicone Joint Sealants: Manufacturer's standard sealant consisting of precured low modulus silicone extrusion, in sizes to fit joint widths indicated, combined with a neutral curing silicone sealant for bonding extrusions to substrates. Subject to compliance with requirements, provide one of the following:
  - 1. "123 Silicone Seal" (Dow Corning Corporation).
  - 2. "UltraSpan US1100" (GE Advanced Materials – Silicones).
  - 3. "Sil-Span" (Pecora Corporation).
- B. Preformed Compressible Seals: Preformed, precompressed, impregnated open cell foam sealant manufactured from high density urethane foam impregnated with a nondrying, water repellent agent; factory produced in precompressed sizes and in roll form to fit joint widths indicated on the Drawings and to develop a watertight and airtight seal when compressed to the degree specified by manufacturer; neoprene rubber suspended in water based emulsion, density 9-10 pcf, with pressure sensitive adhesive factory applied to one side with protective wrapping. Subject to compliance with requirements, provide one of the following:
  - 1. "Emseal 25V" (EMSEAL Joint Systems, Ltd.).
  - 2. "Wilseal 600" (Illbruck Sealant Systems, Inc.).
  - 3. "Polytite Standard" (Polytite Manufacturing Corporation).

## 2.4 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, and primers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, type and material as recommended and 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 materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

## 2.5 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 joint sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 PREPARATION**

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint sealant manufacturer's written instructions and the following requirements:
  - 1. Remove 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. Remove laitance and form release agents from concrete.
  - 3. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    - a. Metal.
    - b. Glass.
- B. Joint Priming: Prime joint substrates where recommended by joint sealant manufacturer or as indicated by preconstruction joint sealant substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's written instructions. Confine primers to areas of joint sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

#### **3.3 INSTALLATION OF JOINT SEALANTS**

- A. General: Comply with joint sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of 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 complying with ASTM C 1193, Figure 8A, unless otherwise indicated.
  - 4. Provide flush joint profile complying with ASTM C 1193, Figure 8B.
  - 5. Provide recessed joint configuration of recess depth and at locations complying with ASTM C 1193, Figure 8C.
    - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.
- G. Installation of Preformed Silicone Sealant System: Comply with the following requirements:
  - 1. Apply masking tape to each side of joint, outside of area to be covered by sealant system.
  - 2. Apply silicone sealant to each side of joint to produce a bead of size complying with preformed silicone-sealant system manufacturer's written instructions and covering a bonding area of not less than 3/8 inch. Hold edge of sealant bead 1/4 inch inside masking tape.
  - 3. Within 10 minutes of sealant application, press silicone extrusion into sealant to wet extrusion and substrate. Use a roller to apply consistent pressure and ensure uniform contact between sealant and both extrusion and substrate.
  - 4. Complete installation of sealant system in horizontal joints before installing in vertical joints. Lap vertical joints over horizontal joints. At ends of joints, cut silicone extrusion with a razor knife.
- H. Installation of Preformed Foam Sealants: Install each length of sealant immediately after removing protective wrapping. Do not pull or stretch material. Produce seal continuity at ends, turns, and intersections of joints. For applications at low ambient temperatures, apply heat to sealant in compliance with sealant manufacturer's written instructions.

- I. Acoustical Sealant Installation: At sound rated assemblies and elsewhere as indicated, seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations.

### 3.4 FIELD QUALITY CONTROL

- A. Field Adhesion Testing: Field test joint sealant adhesion to joint substrates as follows:
  1. Extent of Testing: Test completed and cured sealant joints as follows:
    - a. Perform 10 tests for the first 1,000 feet of joint length for each kind of sealant and joint substrate.
    - b. Perform one test for each 1,000 feet of joint length thereafter or one test per each floor per elevation.
  2. Test Method: Test joint sealants according to ASTM C 1193, Appendix X1, Method A - Field-Applied Sealant Joint Hand Pull Tab, or ASTM C 1521, Method A - Tail Procedure.
    - a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.
  3. Inspect tested joints and report on the following:
    - a. Whether sealants filled joint cavities and are free of voids.
    - b. Whether sealant dimensions and configurations comply with specified requirements.
    - c. Whether sealants in joints connected to pulled out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field adhesion hand pull test criteria.
  4. Record test results in a field adhesion test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
  5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.
- B. Evaluation of Field Adhesion Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

### 3.5 CLEANING

- A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

### 3.6 PROTECTION

- A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

### 3.7 JOINT SEALANT SCHEDULE

- A. Joints in entrances and storefronts construction S-5
- B. Joints in structural glazing construction S-7
- C. Joints in exterior vertical surfaces and horizontal nontraffic surfaces (nonstaining for stone and cementitious) S-2, S-3 and S-6
- D. Joints in interior traffic surfaces S-10
- E. Joints in interior, moving construction, including door frames and tops of interior walls and partitions S-2, S-3 and S-5
- F. Joints exposed in non-moving interior construction S-4
- G. Joints concealed non-moving interior construction S-9
- H. Joints in moist interior environment S-8
- I. Acoustical sound rating locations S-11

### END OF SECTION

## **SECTION 08 11 13**

### **HOLLOW METAL DOORS AND FRAMES**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Hollow metal doors and frames, including fabrication and installation accessories.

##### **1.2 PERFORMANCE REQUIREMENTS**

- A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings and temperature-rise limits indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
  - 1. Smoke- and Draft-Control Door Assemblies: Listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.
  - 2. Oversize Fire-Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a qualified testing agency that doors comply with standard construction requirements for tested and labeled fire-rated door assemblies except for size.
  - 3. Temperature-Rise Limit: At vertical exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F above ambient after 30 minutes of standard fire-test exposure.

##### **1.3 COORDINATION**

- A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.
- B. Coordinate requirements for installation of door hardware, electrified door hardware, and access control and security systems.

##### **1.4 ACTION SUBMITTALS**

- A. Product Data: Copies of manufacturer's data for fabrication and installation instructions.
- B. Shop Drawings:

1. Submit shop drawings for the fabrication and installation. Include details of each frame type, elevations of door design types, conditions at openings, details of anchorage to construction, location and installation requirements of finish hardware and reinforcements, and details of joints and connections.
2. Provide a schedule of doors and frames using same reference numbers for details and openings as those on the Contract Document Drawings. Indicate fire-rated doors and frames, welded and knockdown frames.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.
- B. Certification: When door assemblies required to be fire-rated that exceed manufacturer's capabilities or UL design maximum sizes, submit copies of Door and Frame Manufacturer's Label Certification that each door and frame assembly has been constructed to conform to design, materials and construction equivalent to the requirements for labeled assemblies or products or units tested in accordance with ASTM E 2074.

#### 1.6 QUALITY ASSURANCE

- A. Products: Provide custom welded hollow steel doors and frames by a single firm specializing in the production of custom hollow steel work as evidenced by a minimum of 10 consecutive years production experience.
- B. Provide custom hollow steel doors and frames conforming to the applicable recommended practices contained in the following:
  1. Custom:
    - a. National Association of Architectural Metal Manufacturer's (NAAMM) "Hollow Metal Technical and Design Manual", except as hereafter modified.
    - b. National Association of Architectural Metal Manufacturers (NAAMM) "Guide Specifications for Commercial Hollow Metal Doors and Frames", ANSI/NAAMM HMMA 861, except as herein modified.
  2. Standard: Steel Door Institute (SDI), Standard Steel Doors and Frames, SDI 100/ANSI/SDI A250.8, Recommended Specifications, except as herein modified.

#### 1.7 DELIVERY, STORAGE AND HANDLING

- A. Inspection: Inspect hollow metal work upon delivery for damage. Minor damages may be repaired provided the finish items are equal to new work; otherwise, remove and replace damaged items as directed.
- B. Storage: Store at the building site under cover. Place units on at least 4 inch high wood sills or on floors in a manner that will prevent rust and damage. Avoid the use of non-vented plastic or canvas shelters, which could create a humidity chamber. If the cardboard wrapper on the door becomes wet, remove the carton immediately. Provide a 1/4 inch space between stacked doors to promote air circulation.

## **PART 2 PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Subject to compliance with requirements, provide hollow metal work by one of the following:
  - 1. Ceco Door Products; an Assa Abloy Group company.
  - 2. Curries Company; an Assa Abloy Group company.
  - 3. Steelcraft; an Allegion company.
  - 4. Republic Doors and Frames.

### **2.2 MATERIALS**

- A. Hot-Rolled Steel Sheets and Strips: Commercial quality carbon steel, pickled and oiled, complying with ASTM A 1011/ A 1011 M and ASTM A 568/ A 568M.
- B. Cold-Rolled Steel Sheets: Commercial quality carbon steel, complying with ASTM A 1008/ A 1008M and ASTM A 568/ A 568M.
- C. Metallic Coated Steel Sheets (Exterior Door Faces and Channels, Door Frames): ASTM A 653/ A 653M Commercial Steel (CS), Type B, with an A60 zinc-iron-alloy (galvannealed) coating; stretcher leveled standard of flatness.
- D. Electrolytic Zinc Coated Steel Sheet: ASTM A 591/ A 591M, Commercial Steel (CS), Class B coating; mill phosphatized; suitable for unexposed applications; stretcher leveled standard of flatness where used for face sheets.
- E. Structural Steel Shapes: ASTM A 36/ A 36M.
- F. Steel Bars: ASTM A 108.
- G. Steel Plate: ASTM A 283/ A 283M.
- H. Supports and Anchors: Fabricate of not less than 0.053 inch thick sheet metal. Galvanized after fabrication for units to be built into exterior walls, complying with ASTM A 1008/ A 1008M or ASTM A 1011/ A 1011M, hot-dip galvanized according to ASTM A 153/ A 153M, Class B.
- I. Shop Primer: Modified alkyd rust inhibiting primer paint as standard with door and frame fabricator.
- J. Galvanizing Repair Paint: High zinc dust content paint for repairing galvanizing at welds in galvanized steel, with dry film containing not less than 94 percent zinc dust by weight, and complying with SSPC-Paint 20.
- K. Galvanized Primer: FS TT-P-641F.

### **2.3 FABRICATION – GENERAL**

- A. Fabricate hollow metal units to be rigid, neat in appearance and free from defects, warp, buckle and shadows or surface deformations from welds. Accurately form metal to required sizes and profiles. Wherever practicable, fit and assemble units in the manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at the project site. Weld exposed joints continuously, grind, dress, and make smooth, flush, and invisible.

- B. Prepare hollow metal units to receive finish hardware, including cutouts, reinforcing, drilling and tapping in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 Specifications for Door and Frame Preparation for Hardware, current edition.
- C. Locate finish hardware as shown on final shop drawings or, if not shown, in accordance with National Builders' Hardware Association "Recommended Locations for Builder's Hardware", current edition.

## 2.4 DOOR FABRICATION

- A. Provide full flush design doors, seamless hollow construction. Bevel both vertical edges 1/8 inch.
- B. Fabricate of hot or cold-rolled, stretcher leveled steel sheets. Construct doors with smooth, flush surfaces, continuously welded edge seams without visible joints or seams on exposed faces or stile edges.
- C. Reinforce inside with vertical, hot-rolled steel not less than 0.042 inch thick for interior (SDI - Level 2) and 0.053 inch thick for exterior (SDI - Level 3) steel channel shaped sections or interlocking Z-shaped steel sections. Space vertical reinforcing 6 inches o.c. and extend full door height. Spot weld at not more than 5 inches o.c. to both face sheets.
- D. Interior Doors: SDI - Level 2 - Heavy Duty, Full Flush and Seamless, but not less than the following:
  - 1. Reinforce tops and bottoms of interior doors with 0.042 inch thick horizontal steel channels spot welded at not more than 5 inches o.c. to the outer sheets.
  - 2. Provide not less than 0.042 inch thick steel faces.
  - 3. Provide sound insulation filler of fiberboard, mineral board or other non-combustible material solidly packed full door height to fill the voids between inner core reinforcing members.
  - 4. Fire Door Core: As required to provide hourly fire and temperature rise ratings indicated.
- E. Reinforce doors with rigid tubular frames where stiles and rails are less than 8 inches wide. Form tubular frames with 0.053 inch thick galvanized steel, welded to outer sheets.
- F. Finish Hardware Reinforcement: Unless otherwise indicated herein, reinforce doors for scheduled finish hardware, as follows:
  - 1. Butt Hinges: Steel plate not less than 0.187 inch thick x 1-1/2 inches wide x 6 inches longer than hinge, secured by not less than six spot welds.
  - 2. Continuous Hinges: Steel plate not less than 0.187 inch thick x 1-1/2 inches wide continuous, secured by spot welds 8 inches o.c.
  - 3. Mortise Locksets and Dead Bolts: Not less than 0.067 inch thick steel sheet, secured with not less than two spot welds.
  - 4. Cylindrical Locks: Not less than 0.093 inch thick steel sheet, secured with not less than two spot welds.
  - 5. Flush Bolts: Not less than 0.093 inch thick steel sheet, secured with not less than two spot welds.
  - 6. Surface Applied Closers: Not less than 0.093 inch thick steel sheet, secured with not less than six spot welds.

7. Push Plates and Bars: Not less than 0.053 inch thick steel sheet (except when through bolts are shown or specified), secured with not less than two spot welds
8. Surface Panic Devices: 0.067 inch thick sheet steel (except when through bolts are shown or specified), secured with not less than two spot welds.

## 2.5 HOLLOW-METAL PANELS

- A. Provide hollow-metal panels of same materials, construction, and finish as adjacent door assemblies.

## 2.6 FRAME FABRICATION

- A. General:
  1. Fabricate frames unless noted otherwise of full welded unit construction, with corners full mitered, reinforced, continuously welded inside the full depth and width of frame miter, including returns, soffits and stops.
  2. Knockdown frames will not be acceptable as alternates for welded frames.
  3. Form frames of either cold or hot-rolled sheet steel.
  4. Interior Frames: Provide not less than 0.053 inch thick steel for interior openings, including 4 feet wide.
  5. For openings over 4 feet wide, increase thickness by at least 2 standard thickness.
- B. Welded Frame Corner Joints (Full Profile Welded) :
  1. Fabricate frame members stamped in the flats to a predetermined pattern, designed to provide mitered faces or trims and mitered stops.
  2. After fabricating head and jamb members, fit frames together engaging projecting tabs into corresponding slots in the head.
  3. Tightly close contact edges so that trim and faces are aligned straight, level and true.
    - a. Secure interlocking tabs where they pass thru head slots by welding.
    - b. Continuously weld back bends, soffits and returns together.
    - c. Continuously weld mitered trim joints on each side inside the frame section. Dress and finish exposed joints to produce invisible connections.
    - d. Weld head and jamb together along their intersecting depth and width inside the frame.
    - e. Weld jambs to head overhang along the length of each rabbet, inside the frame completely welding the full joint perimeter.
    - f. Grind welds on exposed surfaces smooth and flush with adjoining surfaces.
- C. Window Frames, Borrowed Lites, Mullions and Transom Bars:
  1. Provide closed or tubular mullions and transom bars. Fasten mullions and transom bars at crossings and to jambs by butt welding. Reinforce joints between frame members with concealed clip angles or sleeves same metal and thickness as frame.
  2. Where installed in masonry, leave vertical mullions in frames open at the top so they can be filled with grout.
  3. Provide steel channel stiffeners on interior of closed mullion sections.
  4. Provide anchors for window and side lites frames same as for doors.
  5. Provide concealed sleeves for frames to be shipped in one piece. Weld and grind smooth field connections.



- D. Welded Frame Jamb Anchors: Furnish jamb anchors as required to secure frames to adjacent construction and as required by fire-rated assemblies, formed of not less than 0.042 inch thick galvanized steel unless noted otherwise.
  - 1. Masonry Construction: Adjustable, flat or corrugated or perforated, T-shaped to suit frame size with leg not less than 2 inches wide, by 10 inches long. Furnish at least three anchors per jamb up to 7 feet-6 inches height; four anchors up to 8 feet jamb height; one additional anchor for each 24 inches or fraction thereof over 8 feet height.
  - 2. Metal Stud Partitions: Insert type with notched clip to engage metal stud, welded to back of frames. Provide at least four anchors for each jamb for frames up to 7 feet-6 inches in height; five anchors up to 8 feet jamb height; one additional anchor for each 24 inches or fraction thereof over 8 feet height.
  - 3. In-Place Concrete or Masonry: Fabricate frames jambs to accept minimum 3/8 inch diameter concealed bolts into expansion shields or inserts at 6 inches from top and bottom and 26 inches o.c., unless otherwise shown. Reinforce frames at anchor locations. Provide non-removable snap-on covers over anchor bolts, unless otherwise indicated.
- E. Floor Anchors: Provide floor anchors for each jamb and mullion which extends to floor, formed of not less than 0.067 inch thick galvanized steel sheet; clip type anchors, with two holes to receive fasteners, welded to bottom of jambs.
- F. Structural Reinforcing Members: Provide structural reinforcing members as a part of frame assembly, where indicated at mullions, transoms or other locations which are to be built into frame.
- G. Head Reinforcing: For frames over 4 feet wide in masonry wall openings, provide continuous steel channel or angle stiffener, not less than 0.093 inch thick for full width of openings, welded to back of frame at head, except where not allowable for label requirements.
- H. Finish Hardware Reinforcement: Unless otherwise indicated herein, reinforce frames for scheduled finish hardware, as follows:
  - 1. Butt Hinges and Pivots: Steel plate not less than 0.187 inch thick x 1-1/2 inches wide x 6 inches longer than hinge, secured by not less than six spot welds.
  - 2. Continuous Hinges: Steel plate not less than 0.187 inch thick x 1-1/2 inches wide x continuous, secured by spot welds 8 inches o.c.
  - 3. Strike Plate Clips: Steel plate not less than 0.187 inch thick x 1-1/2 inches wide x 3 inch long.
  - 4. Surface Applied Closers: Not less than 0.093 inch thick steel sheet, secured with not less than six spot welds.
  - 5. Concealed Closers: Removable steel access plate, not less than 0.093 inch thick internal reinforcement of size and shape required, and enclosing housing to keep closer pocket free of mortar or other materials.
- I. Spreader Bars: Provide removable spreader bar across bottom of frames, tack welded to jambs and mullions.
- J. Rubber Door Silencers: Drill stop to receive three silencers on single door frames and four silencers on double door frames. Install plastic lugs to keep holes clear during construction.

- K. Plaster Guards: Provide 0.016 inch thick steel plaster guards or dust cover boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware installation.

## 2.7 STOPS AND MOLDINGS

- A. Provide stops and moldings around openings in hollow metal door and window units and for frames to receive lights where indicated.
- B. Form fixed stops and moldings integral with door or frame. Provide fixed stops on outside of hollow metal units exposed to exterior and on corridor side of interior units, unless otherwise indicated.
- C. Provide removal stops and molds at other locations, formed of not less than 0.032 inch thick steel sheets. Secure with countersunk machine screws spaced uniformly not more than 1/2 inch o.c. form corners with butted hairline joints.
- D. Coordinate width of rabbet between fixed and removable stops with type of glass or panel and type of installation indicated.

## 2.8 LOUVERS

- A. Provide louvers for interior doors, where indicated, which comply with SDI 111, with blades or baffles formed of 0.020-inch thick, cold-rolled steel sheet set into 0.032-inch- thick steel frame.
  - 1. Sightproof Louver: Stationary louvers constructed with inverted-V or inverted-Y blades.
  - 2. Lightproof Louver: Stationary louvers constructed with baffles to prevent light from passing from one side to the other.
  - 3. Fire-Rated Automatic Louvers: Louvers constructed with movable blades closed by actuating fusible link, and listed and labeled for use in fire-rated door assemblies of type and fire-resistance rating indicated by same qualified testing and inspecting agency that established fire-resistance rating of door assembly.
- B. Form corners of moldings with hairline joints. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.

## 2.9 SHOP PAINTING

- A. Clean surfaces of fabricated units of mill scale, rust, oil, grease, dirt and other foreign matter.
- B. After fabrication, dress, fill and sand tool marks and surface imperfections as required to make faces and vertical edges smooth, level and free of irregularities.
- C. Pretreat cleaned surface in accordance with SSPC-PT-2, SSPC-PT3 or SSPC-PT4. Verify compatibility of primer with galvanized surfaces. Provide primer on galvanized surfaces that will not affect finish paint materials.
- D. Shop Applied Paint:

1. Plain Steel: For steel surfaces, use rust inhibitive enamel or paint, either air drying or baking, suitable as a base for finish paints, complying with ANSI/SDI A250.10 Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces.
2. Galvanized Steel: Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified to comply with ASTM A 780. After applying repair paint, clean surfaces and apply galvanized metal primer compatible coatings to be applied over it.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- A. General: Install hollow metal units and accessories in accordance with the final reviewed shop drawings, manufacturer's written instructions, and as herein specified.
- B. Setting Masonry Anchorage Devices:
  1. Provide masonry anchorage devices where required for securing hollow metal frame to in-place concrete or masonry construction.
  2. Set anchorage devices opposite each anchor location in accordance with details on final shop drawings, fire-rated assembly requirements and anchorage device manufacturer's instructions. Leave drilled holes rough, not reamed and free from dust and debris.
- C. Floor Anchors: Floor anchors may be set with power actuated fasteners instead of masonry anchorage devices and machine screws, if so approved by the Architect.
- D. Placing Frames: Comply with SDI A250.11.
  1. Set frames accurately in position, plumbed, aligned and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders leaving surfaces smooth and undamaged.
  2. For masonry construction, refer to Section 04 20 00 - Unit Masonry.
  3. Install fire-rated frames in accordance with NFPA 80.
  4. At in-place concrete or masonry construction, set frames and secure in place with machine screws and masonry anchorage device.
  5. Make field splices in frames as detailed on final shop drawing, welded and finished to match factory work.
  6. Remove spreader bars only after frames or bucks have been properly set and secured.
  7. Installation Tolerances: Adjust hollow metal door frames to the following tolerances:
    - a. Squareness: Plus or minus 1/16 inch, measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch, measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch, measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch, measured at jambs at floor.
- E. Door Installation: Comply with SDI A250.8.

1. Fit hollow metal doors accurately in their respective frames, with the following clearances:
  - a. Jams and Head: 3/32 inch.
  - b. Meeting Edges, Pairs of Doors: 1/8 inch.
  - c. Bottom: 3/4 inch, where no threshold or carpet (except where scheduled as undercut).
  - d. Bottom: At threshold, carpet or thin-set ceramic tile: Not less than 1/4 inch and not greater than 3/8 inch from floor finish or top of threshold.
2. Install fire-rated doors in accordance with NFPA 80.
3. For hardware refer to Section 08 71 00 - Finish Door Hardware.

### 3.2 ADJUST AND CLEAN

- A. Final Adjustment: Check and readjust operating finish hardware items in hollow metal work just prior to final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames which are warped, bowed or otherwise unacceptable.

### **END OF SECTION**

**SECTION 08 14 16**  
**FLUSH WOOD DOORS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Interior flush wood doors, including factory fitting and machining for hardware and factory applied transparent finishing.
- B. Related Sections:
  - 1. Hollow metal doors frames: Section 08 11 13.
  - 2. Finish door hardware: Section 08 71 00.
  - 3. Glass: Section 08 80 00.
  - 4. Painting: Section 09 91 00.

**1.2 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Shop Drawings:
  - 1. Show elevations, dimensions, construction details for each type of door.
  - 2. Provide door schedule of doors using same reference numbers for openings as those on the Contract Drawings.
- C. Samples:
  - 1. 12 inch x 12 inch corner section of each type door.
  - 2. 12 inch x 12 inch x 1/4 inch to 3/4 inch thick samples with each veneer specified, without stain or finish.
  - 3. Finish Samples:
    - a. 12 inch x 12 inch x 3/4 inch thick pieces of plywood with each veneer specified with a range of stains for selection by the Architect.
    - b. A maximum of four (4) separate sample sets of 3 may be required to obtain the desired stain color and finish appearance for each finish specified.
    - c. Finish samples as specified and numbered for reference of stain and finish. Include on the back of each sample a complete description of the finish and each coat applied.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's Literature:
  - 1. Verification that AWI Quality Certification Labels for Project indicate doors comply with requirements of grades specified.
- B. Warranty: Signed copies of warranty specified herein.

1.4 QUALITY ASSURANCE

- A. Except as otherwise specified herein, provide wood doors conforming with Architectural Woodwork Institute latest standards.
  - 1. Flush Wood Doors: ANSI/WDMA I.S-1A

1.5 DELIVERY, HANDLING AND STORAGE

- A. Individually package doors in corrugated cartons and/or poly bags by the manufacturer with identifying marks.
- B. Store doors flat with spacers between each door, a minimum of 3 inches off the floor. Do not remove doors from cartons or poly bags until painting and other interior finishing work has been completed. Immediately remove from the project site, damaged or otherwise unsuitable doors, when so ascertained.

1.6 PROJECT SITE CONDITIONS

- A. Environmental Requirements: Do not deliver doors until storage areas have been closed in and are thoroughly dry. Do not install wood doors until the required temperature and relative humidity have been stabilized in installation areas per the door manufacturer's requirements.

1.7 WARRANTY

- A. Provide door manufacturer's or fabricator's written warranty stating that the wood doors will be free of faults and defects in accordance with the General Conditions, except that the warranty is to be for the life of the installation for solid core doors, instead of one year from the date of Substantial Completion.
- B. Provide warranty signed by the door manufacturer or fabricator. Warp in excess of that permitted by the WDMA or any defect which affects the operation or appearance of the door is considered a defect under the provisions of the warranty.
- C. Provide warranty including the cost of defective door replacement and the cost of rehanging defective doors.
- D. The door manufacturer or fabricator or his representative is responsible for inspecting the installation of the doors before issuance of the warranty and is to note on the warranty that the doors have been installed in accordance with the manufacturer's recommendations.
- E. This warranty is in addition to, and not a limitation of, other rights the Owner may have against the Contractor under the Contract Documents.

**PART 2 PRODUCTS**

2.1 ACCEPTABLE MANUFACTURERS

- A. Solid Core Doors:
  - 1. Eggers Hardwood Products Corporation, Two Rivers, WI
  - 2. Assa Abloy Wood Doors, Mason City, IA

FLUSH WOOD DOORS

3. Forte Opening Solutions, Tampa, FL
4. Mohawk Flush Doors, Inc., Northumberland, PA
5. VT Industries, Inc., Holstein, IA

## 2.2 DOOR CONSTRUCTION – GENERAL

- A. Flush Solid Core Non-Fire Rated Doors: Flush, solid core, hardwood MDO veneered, AWI latest standards, Premium Grade, 5-ply construction, Performance Duty Level: Heavy Duty.
  1. Cores: Particleboard core construction, ANSI A208.1, Grade 1-LD-2 1-LD-1, Type A: bonded core.
  2. Face Veneers:
    - a. Transparent Finish: (1/40th inch thick before sanding):
      - 1) Wood Species, Veneer Cut: As indicated on the Drawings.
  3. Crossbands: Hardwood, 1/16 inch thick, extending the full width and height of the door.
  4. Adhesives: Type I.
  5. Stiles:
    - a. Vertical: Minimum 1-3/8 inch thick.
    - b. Top and Bottom: Minimum 4-1/2 inches wide.
  6. Edge Bands: Same species as face veneer.
  7. Inner Blocking:
    - a. Top and Bottom: Continuous, minimum 5 inches wide solid wood blocking solid, or wider to assure no through bolting of surface hardware.
    - b. Both Stiles: 5 inch wide x 10 inch long solid wood lock blocking.
  8. Thickness: 1-3/4 inches.

## 2.3 FABRICATION – GENERAL

- A. Factory fit doors to suit frame opening sizes indicated:
  1. Comply with clearance requirements of referenced quality standard for fitting.
- B. Factory machine doors for hardware that is not surface applied.
  1. Locate hardware to comply with DHI WDHS 3.
  2. Comply with final hardware schedules, door frame shop drawings, DHI A115 W series standards, and hardware templates.
  3. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before factory machining.
- C. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
  1. Light Openings: Trim openings with moldings of material and profile indicated.
  2. Louvers: Factory install louvers in prepared openings.

## 2.4 TRANSPARENT FINISHING

- A. Factory finish hardwood veneer doors indicated on the Drawings to receive transparent finishing.
- B. Preparation for finishing and finishing is to conform with AWI latest standards, Premium Grade. Provide finish to match existing.

- C. Seal tops and bottoms of wood door with a heavy coat of varnish or equivalent sealer prior to delivery to the job. Seal vertical edges of doors to receive opaque finishes (paint).

### **PART 3 EXECUTION**

#### **3.1 PREPARATION**

- A. Examine doors and installed door frames, with Installer present, before hanging doors.
  - 1. Verify that installed frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with level heads and plumb jambs.
  - 2. Reject doors with defects.
- B. Starting of work constitutes acceptance of the existing conditions.
- C. Inspect each area of installation and allow doors to acclimate to the area temperature and humidity.

#### **3.2 INSTALLATION**

- A. Install flush wood doors in accordance with the manufacturer's printed instructions, referenced standards, the final reviewed shop drawings and this Section.
- B. Carry doors upright. Do not drag doors. Protect door bottoms with scruff strips. Do not slide across one another. Condition doors to average humidity of spaces before hanging.
- C. Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer. Machine doors for hardware. Seal cut surfaces after fitting and machining including areas routed for concealed closers and other hardware cutouts. Hand doors with hardware specified.
  - 1. Provide uniform clearances at jambs and heads not to exceed 1/8 inch and at bottoms not less than 1/4 inch nor greater than 3/4 inch and not greater than 3/8 inch from floor finish or top of threshold, except where indicated otherwise on the Drawings to be under cut or where required to clear thresholds, floor finishes or for passage of air. Coordinate undercut requirements with various floor materials and trades installing such and provide undercuts to accommodate conditions for installation of doors at no additional cost to the Owner.
- D. Bevels:
  - 1. Bevel non-rated doors 1/8 inch in 2 inches at lock and hinge edges.

#### **3.3 CLEANING AND PROTECTION**

- A. Repair or remove and replace defective doors as directed upon completion of installation. Remove and replace doors which cannot be successfully repaired.
- B. Protection: protect wood until acceptance of the Work by the Owner. Maintain temperature and humidity conditions during the remainder of the construction period to comply with door manufacturer's printed instructions.



- C. Clean door surfaces in accordance with the manufacturer's recommendations. Touch-up factory finished doors in accordance with the manufacturer's printed instructions. Remove and replace doors which cannot be successfully touched-up in the field.

**END OF SECTION**

## **SECTION 08 31 00**

### **ACCESS DOORS**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Access doors, including installation accessories.
- B. Related Sections:
  - 1. Non-structural metal framing: Section 09 22 16
  - 2. Gypsum board: Section 09 29 00.
  - 3. Acoustical ceilings: Section 09 51 00
  - 4. Painting: Section 09 91 00.

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

- A. Shop Drawings: Plan, elevation and details of construction for each type of door specified.

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

- A. Manufacturer's Literature: Materials description and installation instructions.
- B. Coordination Drawings: Provide plans drawn to scale coordinating access doors with items of construction, systems and equipment concealed in ceilings and walls requiring access. Include subcontractor signatures certifying coordination.
- C. Certification: Copies certification of UL listing for fire-rated doors.

##### **1.4 QUALITY ASSURANCE**

- A. Provide access doors in fire-rated construction complying with UL listed and bearing labels required.
- B. Coordination:
  - 1. Coordinate the required sizes, locations and quantities of access panels with the Mechanical, Electrical, Plumbing and Fire Protection Contractors. Provide coordination drawings signed by Mechanical, Electrical, Plumbing and Fire Protection Contractors certifying coordination.
  - 2. Furnish inserts and anchoring devices to be built into other work for installation of access doors. Coordinate delivery with other work to avoid delay.

## **PART 2 PRODUCTS**

### **2.1 ACCEPTABLE MANUFACTURERS**

- A. Karp Associates, Inc., Maspeth, NY 11378.
- B. Milcor Incorporated, Lima, OH 45804.
- C. Nystrom, Inc., Minneapolis, MN 55413.

### **2.2 ITEMS**

- A. Type I: Flush metal panel, fire-rated access door, 1-1/2 hour B label, for gypsum wallboard construction, one of the following:
  - 1. Karp, KRP-350FR.
  - 2. Milcor, UFR DW.
  - 3. Nystrom, UW.
- B. Type II: Flush metal panel access door for gypsum wallboard construction, one of the following:
  - 1. Karp, KDW.
  - 2. Milcor, Style DW.
  - 3. Nystrom, NW.
- C. Type III: Flush metal panel access door for plaster construction, one of the following:
  - 1. Karp, DSC-214PL.
  - 2. Milcor, Style K.
  - 3. Nystrom, NP.
- D. Type IV: Access door with recess for acoustical ceiling panels or tiles, frameless, one of the following:
  - 1. Karp, DSC-210.
  - 2. Milcor, Style AT.
  - 3. Nystrom, RA.
- E. Type V: Access door with recess for gypsum wallboard finish, one of the following:
  - 1. Karp, RDW.
  - 2. Milcor, Style DWR.
  - 3. Nystrom, RW.
- F. Type VI: Access door with recess for plaster finish, one of the following:
  - 1. Karp, DSC-210PL.
  - 2. Milcor, Style AP.
  - 3. Nystrom, RP.
- G. Type VII: Flush panel access door with exposed flange for various non-fire-rated constructions, one of the following:
  - 1. Karp, DSC-214M.
  - 2. Milcor, Style M.
  - 3. Nystrom, NT.

### **2.3 FABRICATION**

- A. Type I: Flush panel metal, fire-rated access door for gypsum wallboard construction:

1. Provide frames of 16 gage steel; panels of 20 gage steel, sandwich type.
  2. Equip panels with an automatic closing mechanism.
  3. Provide door and frame with factory prime coated with baked enamel over a protective phosphate coating on the steel.
  4. Provide continuous steel hinges with stainless steel pin.
  5. Provide cylinder type lock assembly, self-latching with key operated cylinder lock and having a mechanism to release the latch bolt from the inside.
- B. Type II: Flush metal panel access door for gypsum wallboard construction:
1. Provide frame of 16 gage steel with galvanized steel wallboard bead surrounding frame and panel of 14 gage steel.
  2. Provide door and frame factory prime coated with baked enamel over a protective phosphate coating on the steel.
  3. Provide concealed, spring type hinges opening to 175 degrees.
  4. Provide flush locks with metal cam and be a key operated cylinder lock.
- C. Type III: Flush metal panel access door for plaster construction:
1. Provide frame of 16 gage steel door frame with 22 gage galvanized steel plaster casing surrounding frame and panel of 14 gage steel.
  2. Provide door and frame factory prime coated with baked enamel over a protective phosphate coating on the steel.
  3. Provide concealed hinges, spring type, opening to 175 degrees.
  4. Provide flush lock with metal cam and be a key operated cylinder lock.
- D. Type IV: Access door with recess for acoustical ceiling panels or tiles, frameless appearance:
1. Provide frame of 16 gage steel offset to provide for a fully recessed 18 gage steel door fabricated to receive acoustical ceiling panel or tile inserts.
  2. Provide door and frame factory prime coated with baked enamel over a protective phosphate coating on the steel.
  3. Provide continuous pin mounted hinge on longest side opening 180 degrees.
  4. Provide flush screwdriver operated lock with case hardened steel cam lock. Provide plastic grommet to protect hole in acoustical panel or tile for lock.
- E. Type V: Access door with recess for gypsum wallboard finish:
1. Provide frame of 16 gage steel offset to provide for a fully recessed 18 gage steel door fabricated to receive gypsum wallboard inserts.
  2. Provide door and frame factory prime coated with baked enamel over a protective phosphate coating on the steel.
  3. Provide continuous pin mounted hinges on longest side opening 180 degrees.
  4. Provide flush screwdriver operated lock with case hardened steel cam lock. Provide plastic grommet to protect hole in gypsum wallboard for lock.
- F. Type VI: Access door with recess for plaster finish:
1. Provide frame of 16 gage steel with 22 gage galvanized steel plaster casing bead surrounding frame and door panel of 18 gage steel lined with self-furring expanded galvanized metal lath spot welded to the door panel and 22 gage galvanized metal casing beads on four sides of door.
  2. Provide door and frame factory prime coated with baked enamel over a protective phosphate coating on the steel.
  3. Provide concealed hinges, spring type, opening to 175 degrees.

4. Provide flush screwdriver operated lock with case hardened steel cam lock. Provide plastic grommet to protect hole in plaster for lock.
- G. Type VII: Flush panel access door with exposed flange for various non-fire-rated constructions:
  1. Provide frame of 16 gage steel door frame with 14 gage flush steel door.
  2. Provide door and frame factory prime coated with baked enamel over a protective phosphate coating on the steel.
  3. Provide continuous pin mounted hinges on longest side opening 180 degrees.
  4. Provide flush locks, with metal cam and be a key operated cylinder lock.

### **PART 3 EXECUTION**

#### **3.1 INSPECTION**

- A. Examine surfaces to receive the access doors. Verify dimensions of in-place and subsequent construction. Installation of the access doors shall constitute acceptance of the related construction.

#### **3.2 INSTALLATION**

- A. Install access doors as shown, or in the absence of details, in accordance with manufacturer's instructions.
- B. Following installation of the access doors, clean surfaces, lubricate and test operation of moving parts. Make adjustments in operation as necessary.
- C. Deliver keys for access doors to the Owner's Representative with tags identifying each door, its location and description of access.

### **END OF SECTION**

## **SECTION 08 41 26**

### **ALL-GLASS ENTRANCES AND STOREFRONTS**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Interior sliding all-glass entrance doors.
- B. All-glass sidelights and transoms.
- C. Interior all-glass storefronts.

##### **1.2 PREINSTALLATION MEETINGS**

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

##### **1.3 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data: For each type of product.
    - a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for all-glass system.
  - 2. Shop Drawings: For all-glass entrances and storefronts.
    - a. Include plans, elevations, and sections.
    - b. Include details of fittings and glazing, including isometric drawings of patch fittings and rail fittings.
    - c. Door hardware locations, mounting heights, and installation requirements.
  - 3. Samples for Verification: For each type of exposed finish indicated, prepared on Samples of size indicated below.
    - a. Metal Finishes: 6-inch- (150-mm-) long sections of patch fittings and rail fittings, accessory fittings, and other items.
    - b. Glass: 6 inches (150 mm) square, showing exposed-edge finish.
    - c. Door Hardware: For exposed door hardware of each type, in specified finish, full size.
  - 4. Fabrication Sample: Patch fitting at sill on pivot side only, made from 12-inch (300-mm) lengths of full-size components and showing details of the following:
    - a. Joinery.
    - b. Anchorage.
    - c. Glazing with butt glazing.
  - 5. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors sidelights, transoms, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

6. Delegated-Design Submittal: For all-glass systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  - B. Informational Submittals:
    1. Qualification Data: For Installer.
    2. Product Test Reports: For all-glass systems, for tests performed by manufacturer and witnessed by a qualified testing agency.
    3. Sample Warranty: For special warranty.
  - C. Closeout Submittals:
    1. Maintenance Data: For all-glass systems to include in maintenance manuals.
- 1.4 QUALITY ASSURANCE
- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
  - B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
    1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
- 1.5 WARRANTY
- A. Special Warranty: Manufacturer agrees to repair or replace components of all-glass systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
    1. Failures include, but are not limited to, the following:
      - a. Structural failures including excessive deflection.
      - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
      - c. Failure of operating components.
    2. Warranty Period: Two years from date of Substantial Completion, except as follows:
      - a. Concealed Floor Closers: Five years from date of Substantial Completion.

## **PART 2 PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 - Quality Requirements, to design all-glass entrances and storefronts.

- B. General Performance: Comply with performance requirements specified, as determined by testing of all-glass entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- C. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

## 2.2 MANUFACTURERS

- A. Alpha Door & Rail, Inc.
- B. Blumcraft of Pittsburgh; C.R. Laurence Co, Inc.
- C. DORMA USA, Inc.
- D. Nana Wall Systems, Inc.
- E. Oldcastle BuildingEnvelope™.
- F. Virginia Glass Products Corporation.
- G. Vistawall Architectural Products.
- H. Vitro America.

## 2.3 METAL COMPONENTS

- A. Fitting Configuration:
  - 1. Manual-Swinging, All-Glass Entrance Doors Sidelights and Transoms: Patch fittings at head and sill on pivot side only.
  - 2. Manual-Sliding, All-Glass Entrance Doors Sidelights and Transoms: Continuous rail fitting at top and bottom.
  - 3. All-Glass Storefronts: Recessed glazing channel at top and continuous rail fitting at bottom.
- B. Patch Fittings: Stainless-steel-clad aluminum.
- C. Rail Fittings:
  - 1. Material: Stainless-steel-clad aluminum.
  - 2. Height:
    - a. Top Rail: 3-1/2 inches (89 mm).
    - b. Bottom Rail: 3-1/2 inches (89 mm).
  - 3. Profile: Tapered flat.
  - 4. End Caps: Manufacturer's standard precision-fit end caps for rail fittings.
- D. Accessory Fittings: Match patch- and rail-fitting metal and finish for the following:
  - 1. Overhead doorstop.
  - 2. Center-housing lock.
  - 3. Glass-support-fin brackets.
- E. Anchors and Fastenings: Concealed.
- F. Materials:



1. Stainless-Steel Cladding: ASTM A 666, Type 304.
  - a. Finish: No. 4 directional satin finish.

## 2.4 GLASS

- A. Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated surfaces), Type I (transparent), tested for surface and edge compression per ASTM C 1048 and for impact strength per 16 CFR 1201 for Category II materials.
  1. Class 1: Clear monolithic.
    - a. Thickness: 1/2 inch (13 mm).
    - b. Locations: As indicated.
  2. Exposed Edges: Machine ground and flat polished.
  3. Butt Edges: Flat ground.
  4. Corner Edges: Lap-joint corners with exposed edges polished.

## 2.5 ENTRANCE DOOR HARDWARE

- A. General: Heavy-duty entrance door hardware units in sizes, quantities, and types recommended by manufacturer for all-glass entrance systems indicated. For exposed parts, match metal and finish of patch fittings and rail fittings.
- B. Concealed Floor Closers and Top Pivots: Center hung; BHMA A156.4, Grade 1; including cases, bottom arms, top walking beam pivots, plates, and accessories required for complete installation.
  1. Swing: Single or Double acting as indicated on Drawings.
    - a. Positive Dead Stop: Coordinated with hold-open angle if any, or at angle selected.
  2. Hold Open: Automatic, at angle selected.
  3. Opening-Force Requirements:
    - a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N) to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
    - b. Accessible Interior Swinging or Sliding Doors: Not more than 5 lbf (22.2 N) to fully open door.
- C. Concealed Overhead Holder: BHMA A156.8, Grade 1, with dead-stop setting coordinated with concealed floor closer.
- D. Push-Pull Set: As selected from manufacturer's full range.
- E. Cylinders: As specified in Section 08 71 00 "Door Hardware."
- F. Exit Devices: UL 305.
  1. Function: Operation by push-pull.
  2. Latching: At threshold or floor plate and door head.
  3. Style: Surface-mounted vertical rod.
  4. Provide exit devices on both side of door.
- G. Threshold: Not more than 1/2 inch (13 mm) high.
- H. Manual-Sliding Entrance Door Hardware: Manufacturer's standard for sliding action indicated and with twin rollers.
  1. Type: Top-hung, stacking partition.

## 2.6 BUTT-GLAZING SEALANTS

- A. Single-Component, Nonsag, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Uses NT, G, and A.
  - 1. Manufacturers:
    - a. Bostik, Inc.
    - b. Dow Corning Corporation.
    - c. GE Construction Sealants; Momentive Performance Materials Inc.
    - d. May National Associates, Inc.; a subsidiary of Sika Corporation.
    - e. Pecora Corporation.
    - f. Schnee-Morehead, Inc., an ITW company.
    - g. Tremco Incorporated.
  - 2. Sealant shall have a VOC content of 250 g/L or less.

## 2.7 FABRICATION

- A. Provide holes and cutouts in glass to receive hardware, fittings, and accessory fittings before tempering glass. Do not cut, drill, or make other alterations to glass after tempering.
  - 1. Fully temper glass using horizontal (roller-hearth) process, and fabricate so that when glass is installed, roll-wave distortion is parallel with bottom edge of door or lite.
- B. Factory assemble components and factory install hardware and fittings to greatest extent possible.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Examine areas and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 INSTALLATION

- A. Install all-glass systems and associated components according to manufacturer's written instructions.
- B. Set units level, plumb, and true to line, with uniform joints.
- C. Maintain uniform clearances between adjacent components.
- D. Lubricate hardware and other moving parts according to manufacturer's written instructions.
- E. Set, seal, and grout floor closer cases as required to suit hardware and substrate indicated.
- F. Install butt-joint sealants according to manufacturer's instructions and as specified in Section 07 92 00 - Joint Sealants to produce weathertight installation.

3.3 ADJUSTING AND CLEANING

- A. Adjust all-glass entrance doors and hardware to produce smooth operation and tight fit at contact points and weather stripping.
  - 1. For all-glass entrance doors accessible to people with disabilities, adjust closers to provide a three-second closer sweep period for doors to move from a 70-degree open position to 3 inches (75 mm) from the latch measured to the leading door edge.
- B. Remove excess sealant and glazing compounds and dirt from surfaces.

**END OF SECTION**

## **SECTION 08 71 00**

### **DOOR HARDWARE**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Finish hardware required to adequately trim, hang, and operate all doors, as is hereinafter specified and listed in the Hardware Schedule.
  - 1. Provide hardware for doors and frames of unusual profile or shape or other special conditions.
  - 2. Provide all necessary standard and special fasteners, screws, bolts, expansion shields or anchors to properly secure hardware to its intended door, frame, or other surface.

##### **1.2 REFERENCE STANDARDS**

- A. The following reference standards and model code documents shall be used in estimating and detailing door hardware, and shall be considered as a standard of quality, function, and performance, as applicable:
  - 1. IBC 2000 Edition.
  - 2. ANSI-117.1 1992 Edition Providing Accessibility and Usability for Physically Handicapped People.
  - 3. ADAAG Americans with Disabilities Act Accessibility Guidelines.

##### **1.3 SUBMITTALS**

- A. Action Submittals:
  - 1. General: Submit the following in accordance with Section 01 31 00 - Project Management and Coordination.
  - 2. Product Data: Provide a catalog cut sheet, clearly marked and identified, illustrating and describing each product included in the Hardware Schedule.
    - a. Include construction and installation details, material descriptions, dimensions of individual components and profiles, and finishes.
    - b. Formulate catalog cut sheets into sets and include a set with each copy of the Hardware Schedule submitted.
  - 3. Door Hardware Schedule: Prepared by or under the supervision of Architectural Hardware Consultant, detailing fabrication and assembly of door hardware, as well as procedures and diagrams. Coordinate the final Door Hardware Schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
    - a. Format: Comply with scheduling sequence and vertical format in DHI's "Sequence and Format for the Hardware Schedule."
    - b. Organization: Organize the Door Hardware Schedule into door hardware sets indicating complete designations of every item required for each door or opening.

- c. Content: Include the following information:
    - 1) Type, style, function, size, label, hand, and finish of each door hardware item.
    - 2) Complete designations of every item required for each door or opening including name and manufacturer.
    - 3) Fastenings and other pertinent information.
    - 4) Location of each door hardware set, cross-referenced to Drawings, both on floor plans and in door and frame schedule. Use same scheduling sequence and format and use same door numbers and hardware set numbers as in the Contract Documents.
    - 5) Explanation of abbreviations, symbols, and codes contained in schedule.
    - 6) Mounting locations for door hardware.
    - 7) Door and frame sizes and materials.
    - 8) Description of each electrified door hardware function, including location, sequence of operation, and interface with other building control systems.
  - d. Submittal Sequence: Submit the final Door Hardware Schedule at earliest possible date, particularly where approval of the Door Hardware Schedule must precede fabrication of other Work that is critical in the Project construction schedule. Include Product Data, Samples, Shop Drawings of other work affected by door hardware, and other information essential to the coordinated review of the Door Hardware Schedule.
4. Wiring Diagrams: For electrified hardware items specified for this Project, Provide complete wiring diagrams along with riser drawings and elevations, showing locations where such material is to be installed. Wiring Diagrams shall be submitted with Hardware Schedule. Verify and coordinate with the electrical systems installer. Integration shall take effect into central system as specified by Owner.
- a. Operation Narrative: Describe the operation of doors controlled by electrified door hardware.
  - b. Sequence of Operation: Include description of component functions that occur in the following situations:
    - 1) authorized person wants to enter;
    - 2) authorized person wants to exit;
    - 3) unauthorized person wants to enter;
    - 4) unauthorized person wants to exit.
5. Samples for Verification: If so requested by the Architect, provide a sample of any product or item requested, properly marked and tagged, for the opening for which it is intended.
6. Keying: Provide a keying schedule, listing the levels of keying, (GGMK, GKD, MKD or KA) as well as an explanation of the key system's function, the key symbols used and the numbers of the doors controlled. Provide in conjunction with the Door Index/Keying Schedule (which lists the door number, schedule heading, lock type and individual key symbol and remarks or special instructions) mentioned in above. Project shall be Masterkeyed and/or Grand Masterkeyed and provide two (2) keys per lockset or cylinder.
- B. Informational Submittals:

- C. Operation and Maintenance Data: For each type of door hardware to include in maintenance manuals. Provide latest, revised and updated schedule of finish hardware, complete with catalog cuts and keying schedule. In addition, furnish one (1) copy of maintenance and parts manuals for those items for which they are readily available and normally provided.
  - a. Submit in accordance with provisions of Section 01 78 23 - Operation and Maintenance Data.

#### 1.4 QUALITY ASSURANCE

- A. Substitutions: Request for substitutions for alternative hardware items will not be accepted on this Project unless specifically indicated. Specification indicates one (1) specified product, listed hereinafter in the Hardware Schedule, and two (2) acceptable alternative manufacturers for that product. If any specified product is listed as a "No Substitution" product, only that specified product shall be provided as indicated.
- B. Installer Qualifications: An experienced installer who has completed door hardware similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.
- C. Supplier Qualifications: Door hardware supplier with warehousing facilities in Project's vicinity and who is or employs a qualified Architectural Hardware Consultant, available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
  - 1. The hardware supplier shall be engaged regularly in the furnishing, delivery and servicing of contract builder's hardware and must be experienced and knowledgeable in all phases of estimating, detailing, scheduling, masterkeying, shipping and installation practices.
  - 2. When electro-mechanical or electronic hardware is supplied, a qualified individual with a minimum five- (5) year's experience shall be available for assistance.
- D. Architectural Hardware Consultant Qualifications: A person who is currently certified by the Door and Hardware Institute as an Architectural Hardware Consultant and who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project.
- E. Source Limitations: Obtain each type and variety of door hardware from a single manufacturer, unless otherwise indicated.
- F. Regulatory Requirements: Comply with provisions of the following:
  - 1. Provide hardware that complies with Americans with Disabilities Act (ADA), "Accessibility Guidelines for Buildings and Facilities (ADAAG)," and ANSI A117.1.
- G. Fire-Rated Door Assemblies: Provide door hardware for assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 252.
- H. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- I. Keying Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 - Project Management and Coordination. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including, but not limited to, the following:
  - 1. Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
  - 2. Preliminary key system schematic diagram.
  - 3. Requirements for key control system.
  - 4. Address for delivery of keys.
  - 5. Location of Key Cabinet.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Marking and Packaging: All items of hardware shall be delivered to the site in manufacturer's original cartons or boxes. Each item of hardware shall be marked with the abbreviation set forth on the Shop Drawings to ensure that the product reaches its installation destination without needing specific hardware product number knowledge.
- B. Inventory door hardware on receipt and provide secure lock-up for door hardware delivered to Project site.
- C. Tag each item or package separately with identification related to the final Door Hardware Schedule, and include basic installation instructions with each item or package.

#### 1.6 COORDINATION

- A. Templates: Obtain and distribute to the parties involved templates for doors, frames, and other work specified to be factory prepared for installing door hardware. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.
- B. Electrical System Roughing-in: Coordinate layout and installation of electrified door hardware with connections to power supplies, fire alarm system and detection devices, access control system, security system, and building control system, as applicable.

#### 1.7 MAINTENANCE

- A. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of door hardware.
- B. Maintenance Service: If there are any products listed hereinafter that normally require a maintenance or service contract, provide the Owner and Architect with details and costs of standard maintenance or service contract.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of door hardware are indicated in Part 3 "Hardware Schedule" Article. Products are identified by using door hardware designations, as follows:
1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in Part 3 "Hardware Schedule" Article.

### **2.2 MATERIALS**

- A. Screws and Fasteners: Provide all screws and fasteners of the proper size and type to properly anchor or attach the item of hardware scheduled. Provide all fasteners with Phillips heads, unless security type screws (spanner-head or torx-head) are hereinafter specified.
- B. Hinges: Provide as follows:
1. On doors to exterior openings and main corridor doors, and other doors of high frequency use, provide a continuous, gear type hinge of appropriate weight.
  2. Where regular ball bearing hinges are listed for other doors, provide one hinge for each 30-inch of door height.
  3. The width of the hinges shall be sufficient to clear all trim that is mounted to the doorframe.
  4. Hinges shall be guaranteed for life of opening if installed per manufacturer's recommendations.
  5. Acceptable Manufacturers:
    - a. Hager.
    - b. Stanley.
    - c. McKinney.
- C. Continuous Geared Hinges: Continuous hinges shall consist of three (3)-interlocking extrusions in a pinless assembly applied to the full height of the door. All continuous geared hinges shall be manufactured to template screw locations and be non-handed. All mortise hinges and half mortise hinges shall cover and wrap the door edge completely. Doorframe heads shall be extended for clearance on full or half mortise hinges versus downsizing doors for ease of repair and replacement. All frames shall be properly reinforced per manufacturer's standards.
1. Standard warranty shall be for the life of opening.
  2. Acceptable Manufacturers:
    - a. Pemko.
    - b. Select.
    - c. Roton.



- D. Locks: All locks shall be keyed to a key system as not to breach security of system in place. Keying system must be guaranteed of no duplication of existing change keys, master keys or grandmaster keys located in this Project. All keying shall be coordinated with Owner. Locks shall be Grade 1 mortise as hereinafter listed in the Hardware Schedule.
  - 1. Acceptable Manufacturers:
    - a. Sargent 8200.
- E. Lock Trim: Cylindrical/mortise locks are to be furnished with lever handle trim, with levers having a return to within 1/2 inch of the door face, as is hereinafter listed in the Hardware Schedule.
- F. Flush Bolts: Manual flush bolts to have 12-inch rods for doors 7'-6". Doors over 7'-6" high shall have bolts with top rods of 18 inch or 24 inch to allow ease of access to bolt lever. Furnish dust proof strikes for all bottom bolts.
  - 1. Acceptable Manufacturers:
    - a. Ives.
    - b. Trimco.
    - c. Hager.
    - d. Rockwood.
- G. Exit Devices: Exit Devices shall be rim, mortise or vertical rod type as called for in the Hardware Schedule. Devices shall be of the touch-pad type as is hereinafter specified in the Hardware Schedule. Exit devices shall be constructed to allow cylinder to be removed and rekeyed without removing the device from the door either by removable core cylinders or construction of exit device. Exit devices shall be constructed to allow the conversion from one function to another simply within lock stile case and selecting proper outside trim as specified hereinafter in the Hardware Schedule. Devices shall be furnished with outside trim lever handles matching locks.
  - 1. Acceptable Manufacturers:
    - a. Von Duprin 98.
    - b. Sargent 80.
- H. Door Closers: Door closers shall be of cast iron and rectangular design, furnished with a full cover. Provide complete with backcheck, delayed action and hold-open as indicated. Closers shall be mounted out of the line of sight wherever possible (i.e., room side of corridor doors, etc.) with parallel arm mounting on out-swinging doors. Mount closers to jamb or on brackets and/or drop plates, where special conditions require.
  - 1. Acceptable Manufacturers:
    - a. LCN 4040XP.
    - b. Sargent 351.
    - c. Norton 7500.
- I. Push Plates: Push plates are to be .050 brass, bronze or stainless steel with four (4) beveled edges, drilled and countersunk for screws, as is hereinafter specified in the Hardware Schedule.
  - 1. Acceptable Manufacturers:
    - a. Ives.
    - b. Trimco.
    - c. Hager.
    - d. Rockwood.

- J. Door Pulls: Door pulls shall be ADA compliant with a 2 1/2 inch projection from back of pull to face of door. All door pulls shall be thru-bolted or back-to-back mounted.
1. Acceptable Manufacturers:
    - a. Ives.
    - b. Trimco.
    - c. Hager.
    - d. Rockwood.
- K. Protective Plates: Protective plates shall be mop (4"), kick (8") or armor (34") and shall be minimum .050 thick brass, bronze, or stainless steel, with three (3) beveled edges, drilled and countersunk for screws. Plates shall be mounted to avoid louvers and/or glass kits.
1. Acceptable Manufacturers:
    - a. Ives.
    - b. Trimco.
    - c. Hager.
    - d. Rockwood.
- L. Door Stops and Holders: Where a door strikes a wall at approximately 90 degrees, a suitable door stop shall be provided, either a wall bumper or floor stop. Where doors are undercut, provide floor stops with adequate height to properly stop the door. If door would not otherwise strike a wall, an overhead stop shall be provided. In-wall blocking for wall bumpers at stud walls shall be provided in accordance with Section 06 10 53 - Miscellaneous Carpentry. Provide reinforcing in frame and door for overhead stops.
1. Acceptable Manufacturers:
    - a. Ives.
    - b. Hager.
    - c. Glynn-Johnson.
    - d. Rockwood.
    - e. Rixson.
- M. Thresholds and Weatherstrip: Weatherstripping to have aluminum housing, specified insert, and elongated mounting holes. Door sweeps shall be surface mounted, of aluminum/stainless steel housing with specified insert. Overhead drip caps to be of aluminum, have a 2 1/2-inch projection and be 4 inches wider than the door opening. Thresholds shall be of saddle type with no more than 1/2 inch rise. Weatherstripping and smoke seals shall be surface-mounted on doorstop and have 1/4" adjustment slots.
1. Acceptable Manufacturers:
    - a. Pemko.
    - b. Hager.
    - c. NGP.
- N. Wall Magnets: Magnets shall be fail safe and hold until the current is interrupted. Current input shall be factory selected to be 24V AC/DC or 120V AC and be protected against voltage surges up to 600 volts. If voltage less than 120 VAC is indicated, provide transformers as required to accommodate power supply on specified magnets. Maximum holding force shall be forty (40) pounds. Magnet covers shall be of metal composite. Plastic covers will not be accepted.
1. Acceptable Manufacturers:
    - a. LCN.

- b. ABH.
    - c. Dorma.
    - d. Rixson.
  - O. Key Switch: Key switch assembly shall be a momentary/maintained action switch as specified. Mount in single gang electrical box.
    - 1. Acceptable Manufacturers:
      - a. Locknetics.
      - b. Securitron.
      - c. SDC.
  - P. Electromagnetic Locks (Access Control): Electromagnetic lock shall have a 1500 lb. holding force containing a built in passive infrared (PIR) sensor to energize the magnetic lock when a person enters its field of view. Lock shall contain a built-in lighted emergency exit button as a redundant means of de-energizing lock. An access control system shall be integral to the lock with keypads/readers easily wired directly to the lock.
    - 1. Acceptable Manufacturers:
      - a. Locknetics.
      - b. Securitron.
      - c. SDC.
  - Q. Power Supply: Designed and fabricated to interface with all designated electrical security components with no additional hardware. Power supplies shall be Underwriter Laboratories (UL) listed for general-purpose use tested to meet UL 1012 specifications. Power supplies shall have 12/24VDC field selectable output voltage. Output current shall be 1 Amp at 12VDC and 1 Amp at 24VDC. When required, interfacing to an emergency alarm system shall terminate power supply output. Power supply output voltage shall be filtered and regulated.
    - 1. Power supply shall be housed in a standard NEMA 1 enclosure with additional space for a minimum of four (4) 4 Amp/hour batteries providing battery back up when required. An integral battery charging circuit shall be standard. Provide key locking cover to prevent tampering.
      - a. Securitron AQL Series.
      - b. Security Door Controls.
      - c. SDC.
      - d. Von Duprin.
  - R. Intumescent Seal: Intumescent seal shall comply with door and frame manufacturers for positive pressure tests for fire and smoke. (UBC 7-2, Parts 1 & 2/UL10C).
    - 1. Acceptable Manufacturers:
      - a. Pemko.
      - b. Reese.
      - c. NGP.
- 2.3 FINISHES
- A. Hardware finishes shall match and be maintained to BHMA symbols, as indicated in the Hardware Schedule. Strict adherence to base metals and finish is required.
  - B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## 2.4 KEYING

- A. Keying of locks and cylinders throughout project shall be scheduled through a key meeting with Architect, Owner, and hardware supplier. Key schedule shall be prepared and submitted to the Owner for approval. Copies of final key schedule with the bitting instructions shall be submitted as part of the Project Record Documents.
  - 1. Provide cylinders in keyway(s) to match the existing Sargent key system

## 2.5 KEY CONTROL

- A. Provide key cabinet(s) manufactured by of sufficient capacity to handle all keys, plus 50 percent expansion. Provide key control cross-reference chart and accountability (sign-out) tags.
  - 1. Acceptable Manufacturers:
    - a. Telkee.
    - b. Lund.
    - c. Key Control Systems.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire door assembly construction, wall and floor construction, and other conditions affecting performance.
- B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

- A. Steel Doors and Frames: Comply with DHI A115 series.
  - 1. Surface-Applied Door Hardware: Drill and tap doors and frames according to SDI 107 or ANSI A250.6, whichever is more stringent.
- B. Wood Doors: Comply with DHI A115-W series.

## 3.3 INSTALLATION

- A. Installation shall be by a qualified installer with a minimum five (5) year's experience in the installation of commercial grade hardware. Manufacturer's instructions shall dictate templating and installation.
- B. Mounting Heights: Mount door hardware units at heights indicated in following applicable publications, unless specifically indicated or required to comply with governing regulations:
  - 1. Standard Steel Doors and Frames: DHI's "Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames."

2. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- C. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work specified in Division 09 Sections. Do not install surface-mounted items until finishes have been completed on substrates involved.
  1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- D. Key Control System: Place keys on markers and hooks in key control system cabinet, as determined by final keying schedule.
- E. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect prior to installation.
- F. Thresholds: Set thresholds for exterior and acoustical doors in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."

### 3.4 FIELD QUALITY CONTROL

- A. Perform final inspection with hardware installer and hardware supplier present to ensure correct installation and operation, and check for any damaged or defective items. Observe and inspect that all hardware has been installed to its correct destination in proper working order.
- B. Independent Architectural Hardware Consultant: Owner reserves the right to engage a qualified independent Architectural Hardware Consultant to perform a separate independent inspection and to prepare an inspection report.

### 3.5 ADJUSTING

- A. Initial Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended.
  1. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
  2. Electric Strikes: Adjust horizontal and vertical alignment of keeper to properly engage lock bolt.
  3. Door Closers: Adjust sweep period so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.
- B. At completion of the installation and prior to Substantial Completion, make final adjustments to door closures and other items of hardware. Leave all hardware clean and fully operable. Should any item be found to be defective, it shall be repaired or replaced as directed.

- C. Occupancy Adjustment: Approximately three months after date of Substantial Completion, Installer's Architectural Hardware Consultant shall examine and readjust, including adjusting operating forces, each item of door hardware as necessary to ensure function of doors, door hardware, and electrified door hardware.

### 3.6 CLEANING AND PROTECTION

- A. Clean adjacent surfaces soiled by door hardware installation.
- B. Clean operating items as necessary to restore proper function and finish.
- C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

### 3.7 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain door hardware and door hardware finishes. Refer to Division 01 Section "Demonstration and Training."

### 3.8 MANUFACTURER'S ABBREVIATIONS

- A. Abbreviations that could be used within Door Hardware Schedule.
  - 1. MK - McKinney
  - 2. NO - Norton
  - 3. PE - Pemko
  - 4. RF - Rixson
  - 5. RO - Rockwood
  - 6. SA - Sargent

### 3.9 HARDWARE SCHEDULE

- A. See attached.

**END OF SECTION**

**SECTION 08 71 00**

**DOOR HARDWARE**

**ATTACHMENT A – HARDWARE SCHEDULE**

**Set: 2.00 - Offices**

3 Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Office Lock	63 64 8205 LNL	US26D	SA
1 Wall Stop	400	US26D	RO
3 Silencer	608		RO

**Set: 2.02 – Suite Entry**

3 Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Office Lock	63 64 8205 LNL	US26D	SA
1 Surface Closer	P7500 (par. arm)	689	NO
1 Kick Plate	K1050 8" high 4BE CSK	US32D	RO
1 Wall Stop	400	US26D	RO
1 H & J Smoke / Sound Seal Set	S88D		PE

**Set: 2.03 – Suite Secondary**

3 Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Office Lock	63 64 8205 LNL	US26D	SA
1 Surface Closer	P7500 (par. arm)	689	NO
1 Kick Plate	K1050 8" high 4BE CSK	US32D	RO
1 Wall Stop	400	US26D	RO
3 Silencer	608		RO

**Set: 3.01 – Storage Room**

3 Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Storeroom Lock	63 64 8204 LNL	US26D	SA
1 Surface Closer w/ Stop arm	CPS7500	689	NO
1 Kick Plate	K1050 8" high 4BE CSK	US32D	RO
3 Silencer	608		RO

**Set: 4.01 – Conference Rooms**

3 Hinge	TA2714 4-1/2" x 4-1/2"	US26D	MK
1 Classroom Lock	63 64 8237 LNL	US26D	SA
1 Conc Overhead Stop	1-X36	630	RF
1 H & J Smoke / Sound Seal Set	S88D		PE

**Set: 5.03 – Closet**

6 Hinge	TA2714 4-1/2" x 4-1/2"	652	MK
2 Single Dummy Trim	8293 LNL	626	SA
2 Roller Latch	594	626	RO
2 Surface Closer	P7500 (par. arm)	689	NO
2 Wall Stop	400	626	RO
2 Silencer	608		RO



**SECTION 08 71 13**  
**AUTOMATIC DOOR OPERATORS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Low-energy door operators for swinging doors.

**1.2 DEFINITIONS**

- A. AAADM: American Association of Automatic Door Manufacturers.
- B. Activation Device: A control that, when actuated, sends an electrical signal to the door operator to open the door.
- C. Double-Egress (Doors): A pair of doors that simultaneously swing with the two doors moving in opposite directions with no mullion between them.
- D. Double-Swing (Doors): A pair of doors that swing with the two doors moving in opposite directions with a mullion between them; each door functioning as a single-swing door.
- E. Safety Device: A control that, to avoid injury, prevents a door from opening or closing.
- F. For automatic door terminology, see BHMA A156.10 and BHMA A156.19 for definitions of terms.

**1.3 COORDINATION**

- A. Coordinate sizes and locations of recesses in concrete floors for recessed control mats that control automatic door operators. Concrete, reinforcement, and formwork requirements are specified elsewhere.
- B. Templates: Distribute for doors, frames, and other work specified to be factory prepared and reinforced for installing automatic door operators.
- C. Coordinate hardware for doors with operators to ensure proper size, thickness, hand, function, and finish.
- D. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to power supplies and access-control system.

**1.4 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data: For each type of product.
    - a. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for automatic door operators.

- b. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
    - 2. Shop Drawings: For automatic door operators.
      - a. Include plans, elevations, sections, hardware mounting heights, and attachment details.
      - b. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
      - c. Indicate locations of activation and safety devices.
      - d. Include diagrams for power, signal, and control wiring.
      - e. Include plans, elevations, sections, and attachment details for guide rails, if required.
  - B. Informational Submittals:
    - 1. Qualification Data: For Installer.
    - 2. Product Certificates: For each type of automatic door operator.
    - 3. Sample Warranties: For manufacturer's special warranties.
  - C. Closeout Submittals:
    - 1. Maintenance Data: For automatic door operators, safety devices, and control systems, to include in maintenance manuals.
- 1.5 QUALITY ASSURANCE
- A. Source Limitations: Obtain automatic door operators, including activation and safety devices, from single source from single manufacturer.
  - B. Installer Qualifications: An authorized representative who is trained and approved by manufacturer for installation and maintenance of units required for this Project.
    - 1. Maintenance Proximity: Not more than two hours' normal travel time from Installer's place of business to Project site.
- 1.6 WARRANTY
- A. Special Warranty: Manufacturer agrees to repair or replace components of automatic door operators that fail in materials or workmanship within specified warranty period.
    - 1. Failures include, but are not limited to, the following:
      - a. Faulty or sporadic operation of automatic door operator, including controls.
      - b. Deterioration of metals, metal finishes, and other materials beyond normal weathering or use.
    - 2. Warranty Period: Two years from date of Substantial Completion.

## **PART 2 PRODUCTS**

### **2.1 AUTOMATIC DOOR OPERATORS, GENERAL**

- A. General: Provide operators of size recommended by manufacturer for door size, weight, and movement; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated; and according to UL 325. Coordinate operator mechanisms with door operation, hinges, and activation and safety devices.

1. Fire-Rated Doors: Provide door operators for fire-rated door assemblies that comply with NFPA 80 for fire-rated door components and are listed and labeled by a qualified testing agency.
- B. Electromechanical Operating System: Self-contained unit powered by permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor, connections for power and activation-and safety-device wiring, and manual operation including spring closing when power is off.
- C. Hinges: Reference Section 08 71 00 - Door Hardware for hinge type for each door that door operator shall accommodate.
- D. Cover for Surface-Mounted Operators: Fabricated from 0.125-inch- (3.2-mm-) thick, extruded or formed aluminum; manufacturer's standard width; with enclosed end caps, provision for maintenance access, and fasteners concealed when door is in closed position.
- E. Brackets and Reinforcements: Fabricated from aluminum with nonstaining, nonferrous shims for aligning system components.
- F. Fire-Door Package (if required): Consisting of UL-listed latch mechanism, power-reset box, and caution signage for fire-rated doors. Latch mechanism shall allow door to swing free during automatic operation; when fire is detected, latch actuator shall cause exit hardware to latch when door closes. Provide latch actuators with fail-secure design.
- G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

## 2.2 LOW-ENERGY DOOR OPERATORS

- A. Standard Duty:
  1. Manufacturers:
    - a. Besam Entrance Solutions; SW100.
    - b. DORMA Automatics; ED100.
    - c. Horton Automatics; EasyAccess Series 7100.
    - d. LCN Closers; 4600 Series.
    - e. Stanley Access Technologies, LLC; Magic-Access.
- B. Standard: BHMA A156.19.
- C. Performance Requirements:
  1. Opening Force if Power Fails: Not more than 15 lbf (67 N) required to release latch if provided, not more than 30 lbf (133 N) required to manually set door in motion, and not more than 15 lbf (67 N) required to fully open door.
- D. Configuration: As scheduled at end of Section.
  1. Operator to control single swinging door or pair of swinging doors.
  2. Traffic Pattern: Two way or double egress.
  3. Operator Mounting: Surface.

- E. Operation: Power opening and spring closing. Provide time delay for door to remain open before initiating closing cycle as required by BHMA A156.19. When not in automatic mode, door operator shall function as manual door closer, with or without electrical power.
- F. Operating System: Electromechanical.
- G. Microprocessor Control Unit: Solid-state controller.
- H. Features:
  - 1. Adjustable opening and closing speed.
  - 2. Adjustable opening and closing force.
  - 3. Adjustable backcheck.
  - 4. Adjustable hold-open time from zero to 30 seconds.
  - 5. Adjustable time delay.
  - 6. Adjustable acceleration.
  - 7. Obstruction recycle.
  - 8. On-off/hold-open switch to control electric power to operator; key operated.
- I. Controls: Activation and safety devices according to BHMA standards.
  - 1. Activation Devices: Activate doors by the following equipment. Refer to the Door Schedule for locations.
    - a. Card scanners (by others) on each side of door to activate door operator.
    - b. Motion sensor mounted on ingress side of door header to detect pedestrians in activating zone and to open door.
    - c. Push-plate switch on each side of door to activate door operator.
    - d. Access by remote switch at Nurse's Station.
  - 2. Safety Device: Presence sensor mounted on door header to detect pedestrians in presence zone and to prevent door from closing.
- J. Exposed Finish: Baked-enamel or powder-coat finish.
- K. Color: As selected by Architect from full range of industry colors and color densities.

## 2.3 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  - 1. Extrusions: ASTM B 221 (ASTM B 221M).
  - 2. Sheet: ASTM B 209 (ASTM B 209M).
- B. Expanded Aluminum Mesh: Expanded and flattened aluminum sheet according to the geometry of ASTM F 1267.
- C. Fasteners and Accessories: Corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

## 2.4 CONTROLS

- A. General: Provide controls, including activation and safety devices, according to BHMA standards; for condition of exposure; and for long-term, maintenance-free operation under normal traffic load for occupancy type indicated. Coordinate activation and safety devices with door operation and door operator mechanisms.

- B. Push-Plate Switch: Momentary-contact door control switch with flat push-plate actuator with contrasting-colored, engraved message.
  - 1. Configuration: Rectangular push plate with 2-by-4-inch (50-by-100-mm) junction box.
    - a. Mounting: Recess mounted, semiflush in wall.
  - 2. Push-Plate Material: Stainless steel.
  - 3. Message: "Push to Open."
- C. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

## 2.5 FABRICATION

- A. Factory fabricate automatic door operators to comply with indicated standards.
- B. Form aluminum shapes before finishing.
- C. Fabricate exterior components to drain condensation and water passing joints within operator enclosure to the exterior.
- D. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, finished to match operator.

## 2.6 ACCESSORIES

- A. Signage: As required by cited BHMA standard for type of door and its operation.
  - 1. Application Process: Operator manufacturer's standard process.

## 2.7 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.
- B. Apply organic and anodic finishes to formed metal after fabrication unless otherwise indicated.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

## 2.8 ALUMINUM FINISHES

- A. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, door and frame preparation and reinforcements, and other conditions affecting performance of automatic door operators.
- B. Examine roughing-in for electrical systems to verify actual locations of power connections before automatic door operator installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.
- D. Access Control System: Connect operators to access control system as specified in Division 28 Access Control Sections.
- E. Signage: Apply on both sides of each door as required by cited BHMA standard for type of door operator and direction of pedestrian travel.

#### **3.2 ADJUSTING**

- A. Adjust automatic door operators to function smoothly, and lubricate as recommended by manufacturer; comply with requirements of applicable BHMA standards.
  - 1. Adjust operators on exterior doors for weathertight closure.
- B. After completing installation of automatic door operators, inspect exposed finishes on doors and operators. Repair damaged finish to match original finish.
- C. Readjust automatic door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).
- D. Occupancy Adjustment: When requested within 12 months of date of Substantial Completion, provide on-site assistance in adjusting system to suit actual occupied conditions. Provide up to two visits to Project during other-than-normal occupancy hours for this purpose.

#### **3.3 MAINTENANCE SERVICE**

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include three months' full maintenance by skilled employees of automatic door operator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper door operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  - 1. Engage a Certified Inspector to perform safety inspection after each adjustment or repair and at end of maintenance period. Furnish completed inspection reports to Owner.
  - 2. Perform maintenance, including emergency callback service, during normal working hours.
  - 3. Include 24-hour-per-day, 7-day-per-week, emergency callback service.

3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain automatic door operators.

**END OF SECTION**

## **SECTION 08 80 00**

### **GLAZING**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Glass and glazing accesories.
- B. Related Sections:
  - 1. Rough carpentry: Section 06 10 00.
  - 2. Building thermal insulation Section 07 21 00.
  - 3. Joint Sealants: Section 07 92 00.
  - 4. Hollow steel doors and windows: Section 08 11 13.
  - 5. Flush wood doors: Section 08 14 16.
  - 6. Glazing Surface Films: Section 08 87 00.

##### **1.2 PERFORMANCE REQUIREMENTS**

- A. Delegated Design:
  - 1. Design exterior glazing, including comprehensive analysis, using performance requirements, design criteria and industry standards indicated herein.
  - 2. The glass manufacturer is responsible for the analysis and engineering of glass and glazing, as well as the fabrication and installation of the glass and glazing.
- B. General: Provide glazing systems capable of withstanding normal thermal movement, and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- C. Manufacturer's Engineering Analysis: For glass for exterior openings, the glass manufacturer is to perform wind load and thermal stress analyses and is to demonstrate compliance of glass with performance requirements.
- D. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:
  - 1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
    - a. Impact Loads For Interior Installations: Per applicable code or herein referenced industry standard.



- b. Window/Curtain Wall (Guardrails) Infill: Design glass in windows and curtain wall as a guardrail in glass areas below 42 inches above the finish floor. Design glass in these areas to resist a horizontal impact load of 200 pounds applied to any 1 square foot of infill area, at any point, in any direction on the glass infill.
  - 2. Maximum Lateral Deflection: For the following types of glass supported on four edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch, whichever is less.
    - a. For monolithic glass lites heat treated to resist wind loads.
    - b. For insulating glass.
    - c. For laminated glass lites.
- E. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime sky heat loss and a temperature change (range) of 120 deg F ambient; 180 deg F, material surfaces.

### 1.3 ACTION SUBMITTALS

- A. Product data.
- B. Samples for Verification:
  - 1. 12 inch x 12 inch samples of each type glass.
  - 2. Color samples of glazing sealant selected.
  - 3. 12 inch x 12 inch samples of spandrel glass colors selected.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Literature: Materials description and installation instructions for glazing materials.
- B. Design Calculations: Provide design calculations showing conformance with the specified performance requirements prepared and certified by the glass manufacturer.
- C. Compatibility and Adhesion Test Report: Submit copies of statement from sealant manufacturer indicating that glass and glazing materials have been tested for compatibility and adhesion with glazing sealants and interpreting test results relative to material performance, including recommendations for primers and substrate preparation needed to obtain adhesion.
- D. Warranties: Signed copies of insulating glass units, coated and laminated glass and unframed mirror warranties.

### 1.5 QUALITY ASSURANCE

- A. Comply with the following:
  - 1. GANA Publications: GANA's - Glazing Manual.
  - 2. Glazing Material: FS DD-G-451D and ASTM C 1036.

3. Glass Coating: ASTM C 1376 Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Glass.
  4. Safety Glazing: ASTM C 1048, ASTM C 1172, ANSI Z97.1, U.S. Consumer Product Safety Commission Standard 16 CFR 1201 CI and CII, and GANA'S - Glazing Manual and Laminated Glass Design Guide.
- B. Unless otherwise shown or governed by other referenced standards specified, conform with details and procedures of GANA Glazing Manual, (National Glass Association).
- C. Installer Qualifications: An experienced installer, as evidenced by a minimum of 5 consecutive years experience, and who has completed glazing similar in material, design, and extent to that indicated for project and whose work has resulted in construction with a record of successful in-service performance.
- D. Source Limitations:
1. Insulating Glass: Obtain insulating glass units from one manufacturer using the same type of glass and other components for each type of unit indicated.
  2. Laminated Glass: Obtain laminated glass units from one manufacturer using the same type of glass lites and interlayers for each type of unit indicated.
  3. Tempered Glass: Obtain tempered glass units from one manufacturer using the same type of glass and tempering process for units.
- E. In the event of a conflict between specified standards or references the more stringent or greater is to take precedent and be the one utilized for the design and installation.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver glazing materials to project site in manufacturer's unopened containers, fully identified with trade name, color, size, hardness, type, class and grade. Store each item in accordance with manufacturer's instructions. Immediately remove from the job site damaged or otherwise unsuitable material, when so ascertained.

#### 1.7 WARRANTY

- A. Insulating Glass Units:
1. Provide insulating glass unit manufacturer's written warranty for the insulating glass units to be free of visual obstruction due to internal moisture or dust collecting on the interior glass surfaces.
  2. Provide warranty in accordance with the General Conditions, except the warranty period is to be for 10 years instead of 1 year.
  3. Provide warranty signed by the subcontractor and Insulating Glass Manufacturer with copies submitted to the Architect.
- B. Laminated Glass: Provide a written 5 year warranty from date of manufacture for laminated glass. Warranty covers deterioration due to normal conditions of use and not to handling, installing, and cleaning practices contrary to the glass manufacturer's published instructions.
- C. The above warranties are in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- A. Clear Float Glass: Complying with ASTM C 1036, Type I, Class 1, Quality Q3, thickness as shown or specified.
  - 1. Products:
    - a. Guardian, clear glass.
    - b. Pilkington Libbey-Owens-Ford (LOF), clear glass.
    - c. Vitro Architectural Glass, clear glass.
- B. Fully Tempered Clear Float Glass: Complying with ASTM C1048, Class 1 Clear, Condition A (uncoated); Quality-Q3, thickness as shown or specified.
  - 1. Fully tempered glass at doors and adjacent lites, where shown on Drawings, where specified, and where required by code.
  - 2. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
  - 3. For clear or low-iron glass 1/4 to 3/8-inch thick without ceramic frit or ink, maximum + or – 100 mD (millidiopter) over 95 percent of the glass surface.
  - 4. Maximum peak to valley rollerwave 0.003" (0.08mm) in the central area and 0.008-inches (0.20mm) within 10.5-inches (267mm) of the leading and trailing edge.
- C. Clear Laminated Glass: Complying with ASTM C 1172, two layers of tempered or heat strengthened clear glass laminated with clear polyvinyl butyral (PVB) interlayer, thickness as indicated determined by the glass manufacturer to comply with the specified performance requirements. Provide interlayer by one of the following:
  - 1. "Trosifol" (Kuraray America, Inc.).
  - 2. "Saflex" (Eastman Chemical Company).
- D. Glazing Tape: Polyisobutylene/Butyl, complying with ASTM C 1281:
  - 1. Dap, Inc., Butyl Rubber Tape.
  - 2. Pecora Corporation, G-66 or BB-50.
  - 3. Tremco, Tremco 400 Tape.
- E. Setting Blocks: Neoprene blocks, 70 to 90 Type A durometer hardness.
- F. Spacers: Neoprene blocks, 40 to 50 Type A durometer hardness, 3 inches long, self-adhesive on one face only.
- G. Safety Glazing Labeling: Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

### **2.2 HEAT TREATED TEMPERED AND HEAT STRENGTHENED GLASS**

- A. Provide tempered and heat strengthened glass horizontally heat treated in accordance with FS DD-G-1430B. Fabricate tempered and heat strengthened glass units so that roll distortion lines are parallel to the bottom edge of the glass units and the bottom or sill of the glazing pocket into which the glass unit is being installed.

- B. Provide heat treated glass complying with ASTM C 1048 for the following:
  - 1. Kind HS: Heat strengthened.
  - 2. Kind FT: Fully tempered.

## 2.3 CHANNELS

- A. Aluminum channel:
  - 1. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221 (ASTM B221M), Alloy 6063-T5.
  - 2. Aluminum Thickness: minimum 1/8 inch.
  - 3. Dimensions: As indicated on Drawings.
  - 4. Finish: Anodize or powder coat as selected by Architect.

## 2.4 GLAZING SEALANTS

- A. Provide products of type indicated, complying with the following requirements:
  - 1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

## 2.5 FABRICATION OF GLAZING UNITS

- A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.
- C. Grind smooth and polish exposed glass edges and corners.

## 2.6 GLAZING SCHEDULE

- A. Glass Type GL-1 (Laminated): Clear laminated glass with two plies of fully tempered float glass. Overall thickness: 3/8-inch.
  - 1. Minimum thickness of each glass ply: 3mm.
  - 2. Interlayer thickness: 0.375 inch.
  - 3. Interlayer pattern: Match Architect's Samples.
  - 4. Safety Glazing required.
- B. Glass Type GL-2 (Monolithic): 3/8-inch clear glass, fully tempered.

### **PART 3 EXECUTION**

#### **3.1 PREPARATION**

- A. Examine surfaces to receive the parts of the work specified herein. Verify dimensions of in-place and subsequent construction. Application or installation of materials constitutes acceptance of the related construction.

#### **3.2 INSTALLATION - GENERAL**

- A. Employ only experienced glazers who have had previous experience with the materials and systems being applied. Use tools and equipment recommended by the glass manufacturer.
- B. Measure openings and cut glass accurately to fit each opening with minimum edge clearances and bite on glass as specified by GANA. If glass is to be cut to size at project site deliver each piece to project at least 2 inches larger (in both dimensions) than required, so as to facilitate the cutting of clean cut edges without necessity of seaming or nipping. Do not seam, nip or abrade tempered glass at the job site.
- C. Maintain a minimum temperature of 40 deg F during glazing unless the manufacturer of the glazing materials specifically agrees to application of his materials at lower temperatures. If job progress or other conditions require glazing work when temperatures are below 40 deg F (or below minimum temperature recommended by the manufacturer), consult the manufacturer and establish the minimum provisions required to ensure satisfactory work. Record in writing to the manufacturer, with copy to the Architect, the conditions under which such glazing work proceeds and the provisions made to ensure satisfactory work.
- D. Clean glazing stops and rabbets to receive glazing materials of obstructions and deleterious substances which might impair the work. Remove protective coatings which might fail in adhesion or interfere with bond of sealants. Comply with manufacturer's instructions for final wiping of surfaces immediately before application of primer and glazing sealants or tapes.
- E. Prime surfaces to receive glazing sealants in accordance with manufacturer's recommendations, using recommended primers. Test materials and surfaces for adhesion of sealants.
- F. Inspect each piece of glass immediately before installation. Do not install pieces which have significant impact damage at edges, scratches or abrasion of faces or any other evidence or damage.
- G. Locate setting blocks at the quarter points of sill but no closer than 6 inches to corners of glass. Use blocks of proper size to support the glass in accordance with manufacturer's recommendations.
- H. Provide spacers for glass to separate glass from stops, except where continuous gaskets or tape are required. Locate spacers 36 inches o.c. maximum inside and out, with a minimum of 2 spacers per edge of glass. Provide thickness equal to sealant or compound thickness shown. Provide width as required for minimum of 3/8 inch bite on glass at edges.

- I. Set glass in a manner which produces greatest possible degree of uniformity in appearance. Face glass, which has dissimilar faces, with matching faces in the same direction. Set glass with bow (if any) to exterior.
- J. Install tempered and heat strengthened glass units with the roll distortion parallel to the bottom or sill glazing pocket in accordance with the glass manufacturer's recommendations for the type of glass installation.
- K. Do not use glazing materials from different sources in the same joint system unless the manufacturer of each material has stated in writing that his material is fully compatible with the other material.
- L. Install glass flooring with frame clearances recommended by the glass flooring manufacturer.
- M. Use masking tape or other suitable protection to limit coverage of glazing materials to the surfaces intended for sealants.
- N. Glazing Tape:
  - 1. Butt or lap ends of sealant tape in accordance with the manufacturer's recommendations.
  - 2. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
  - 3. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
  - 4. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
  - 5. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
  - 6. Do not remove release paper from tape until just before each glazing unit is installed.
- O. Clean excess sealant from glass and framing members immediately after application, using solvents or cleaners recommended by manufacturers.

### 3.3 GASKET GLAZING (DRY)

- A. Install glass units in curtain walls, windows, doors, sidelites, interior glazing channels and metal framed skylights using curtain wall, glazing channel, window door or skylight manufacturer's standard extruded glazing gaskets and strips installed in accordance with manufacturer's printed installation instructions.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

- D. Install gaskets so they protrude past face of glazing stops.

#### 3.4 PROTECTION AND CLEANING

- A. Protect glass from breakage immediately upon installation. Use streamers or ribbons suitably attached to framing and held free of glass. Do not apply warning markings directly to the glass.
- B. Remove and replace glass which is broken, cracked, chipped or damaged in any way and from any source, including weather, vandalism and accidents during the construction period.
- C. Maintain glass in a reasonably clean condition during construction so that it will not become stained and will not contribute to the deterioration of glazing materials.
- D. Wash and polish glass on both faces just prior to final acceptance. Comply with instructions and recommendations of glass manufacturer and glazing materials manufacturer for cleaning in each case.

#### **END OF SECTION**

**SECTION 08 87 00**  
**GLAZING SURFACE FILMS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Glazing surface films, including installation materials.
- B. Related Sections:
  - 1. Glazing: Section 08 80 00

**1.2 REFERENCE STANDARDS**

- A. ASTM International (ASTM):
  - 1. ASTM E 84 - "Standard Test Method for Surface Burning Characteristics of Building Materials."
  - 2. ASTM E 903 - "Test Method for Solar Absorptance, Reflectance, and Transmittance of Materials Using Integrating Spheres."
  - 3. ASTM D 3330 - "Standard Test Methods for Peel-Adhesion at 180 Degree Angle."

**1.3 SUBMITTALS**

- A. Product Data: For each film product indicated.
- B. Samples for Color Selection: Manufacturer's standard sample sets showing the full range of colors available for each type of product indicated.
- C. Samples for Verification: 12-inch square samples of each type of glazing film specified, in color specified.
- D. Warranty: Special warranty specified in this Section.
- E. Maintenance Data and Replacement Instructions: For each type of film overlay to include in maintenance manuals.

**1.4 QUALITY ASSURANCE**

- A. Installer Qualifications: Engage an experienced installer certified, licensed, or otherwise qualified by film manufacturer as having the necessary experience, staff, and training to install manufacturer's products according to specified requirements.
- B. Source Limitations: Obtain each type of film overlay through one source from a single manufacturer to provide products of consistent quality in appearance and physical properties.



1.5 DELIVERY, STORAGE, AND HANDLING

- A. Delivery: Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.
- B. Store and protect glazing films according to manufacturer's written instructions and as needed to prevent damage, condensation, temperature changes, direct exposure to sun, or other causes.

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with film installation when ambient and substrate temperature conditions are outside limits permitted by manufacturer and when glass substrates are wet from frost, condensation, or other causes.

1.7 WARRANTY

- A. Surface Film Manufacturer is to warrant in writing the specified glazing surface film to be free from faults and defects including fading, delamination, peeling, cracking, or blistering in accordance with the General Conditions, except the warranty is to be for five (5) years instead of one (1) year.
- B. Provide warranty covering both labor and material to replace glazing surface film which becomes defective in any of the categories listed above.
- C. Provide copies of warranty signed by the Glazing Surface Film Manufacturer and submit to the Architect.
- D. This warranty is in addition to, and not a limitation of, other rights the Owner may have under the Contract Documents.

1.8 MOCK-UP INSTALLATION

- A. Apply glazing film to not less than 9 square feet of glass, in locations as directed by Architect to verify selections made under sample selections and to demonstrate aesthetic effects and qualities of materials and execution.
  - 1. Obtain approval of field samples before continuing with remainder of installation.
  - 2. Maintain field samples during remainder of installation in an undisturbed condition as a standard for judging the completed Work.
  - 3. Approved field samples may become part of the completed Work.

**PART 2 PRODUCTS**

2.1 GLAZING SURFACE FILMS

- A. Film Overlay: Single-layered applied glazing film products, 2 mils minimum thickness, applied to interior glass surfaces, consisting of the following (from outboard surface to inboard surface), as applicable to each type of film indicated:
  - 1. Removable release liner.
  - 2. Pressure sensitive adhesive.
  - 3. Clear, dyed, etched or printed pattern layer of polyester film.

- 4. Scratch resistant coating.
- B. Manufacturers: Provide one of the following:
  - 1. 3M Fasara
  - 2. Decorative Films, LLC
  - 3. LLumar iLLusions
- C. Product and Color: Custom full height film as selected by Architect from manufacturer's full range.

## 2.2 GLAZING FILM ACCESSORIES

- A. General: Provide products complying with requirements of glazing film manufacturer for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Adhesive: Pressure Sensitive acrylic adhesive system.
- C. Cleaners, Primers, and Sealers: Types recommended by glazing film manufacturer.

## **PART 3 EXECUTION**

### 3.1 EXAMINATION

- A. Examine glass and surrounding adjacent surfaces for conditions affecting installation.
  - 1. Report conditions that may adversely affect installation. In report, include description of any glass that is broken, chipped, cracked, abraded, or damaged in any way.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Immediately before beginning installation of films, clean glass surfaces of substances that could impair glazing film's bond, including mold, mildew, oil, grease, dirt and other foreign materials.
- C. Blade the inside surface of window glass with industrial razors to ensure removal of foreign contaminants.
- D. Protect window frames and surrounding surfaces and materials from damage during installation.

### 3.3 INSTALLATION

- A. General: Comply with glazing film manufacturers' written installation instructions applicable to products and applications indicated, except where more stringent requirements are indicated.
- B. Install film continuously, but not necessarily in one continuous length. Install with no gaps or overlaps.

- C. If seamed, install with no gaps or overlaps. Install seams vertical and plumb. No horizontal seams allowed.
- D. Do not remove release liner from film until just before each piece of film is cut and ready for installation.
- E. Install film with mounting solution and custom cut to the glass with neat, square comers and edges to within 1/8 inch of the window frame.
- F. Remove air bubbles, wrinkles, blisters, and other defects.
- G. After installation, view film from a distance of 10 feet against a bright uniform sky or background. Film shall appear uniform in appearance with no visible streaks, banding, thin spots, blisters or pinholes.
  - 1. If installed film does not meet this criteria, remove and replace with new film.

#### 3.4 CLEANING

- A. Remove excess mounting solution at finished seams, perimeter edges, and adjacent surfaces.
- B. After application of film, wash film using cleaning methods recommended by glazing film manufacturer. Do not use abrasive-type cleaning agents or bristle brushes.
- C. Replace films that cannot be cleaned.

#### **END OF SECTION**

**SECTION 09 05 61.13**

**MOISTURE VAPOR EMISSION CONTROL**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Fluid-applied, resin-based, membrane-forming systems that control the moisture-vapor-emission rate of high-moisture, interior concrete to prepare it for floor covering installation.

**1.2 UNIT PRICES**

- A. Work of this Section is affected by Moisture Vapor Emission Control Unit Price and will be applied under the following conditions:
  - 1. In the event that the results of pre-construction testing determine or reveal that relative humidity, vapor emission levels, or alkalinity-pH of concrete floor slabs fall within adhesive and finish flooring system manufacturer's recommended maximum levels, Owner may elect to omit system.

**1.3 DEFINITIONS**

- A. MVE: Moisture vapor emission.
- B. MVER: Moisture vapor emission rate.

**1.4 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data: For each type of product.
- B. Informational Submittals:
  - 1. Qualification Data: For Installer and manufacturer.
  - 2. Product Test Reports: For each MVE-control system, for tests performed by manufacturer and witnessed by a qualified testing agency.
  - 3. Preinstallation testing reports.
  - 4. Field quality-control reports.

**1.5 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Employs factory-trained personnel who are available for consultation and Project-site inspection.
- B. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages and containers, with seals unbroken, bearing manufacturer's labels indicating directions for storage and mixing with other components.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Comply with MVE-control system manufacturer's written instructions for substrate and ambient temperatures, humidity, ventilation, and other conditions affecting system installation.
  - 1. Store system components in a temperature-controlled environment and protected from weather and at ambient temperature of not less than 65 deg F (18 deg C) and not more than 85 deg F (29.4 deg C) at least 48 hours before use.
  - 2. Maintain ambient temperature and relative humidity in installation areas within range recommended in writing by MVE-control system manufacturer, but not less than 65 deg F (18 deg C) or more than 85 deg F (29.4 deg C) and not less than 40 or more than 60 percent relative humidity, for 48 hours before installation, during installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.
  - 3. Install MVE-control systems where concrete surface temperatures will remain a minimum of 5 deg F (3 deg C) higher than the dew point for ambient temperature and relative humidity conditions in installation areas for 48 hours before installation, during installation, and for 48 hours after installation unless longer period is recommended in writing by manufacturer.

1.8 WARRANTY

- A. Warranty: Manufacturer to warrant control system products and components to maintain adhesion to all types of concrete substrates, concrete silicates and treatments, tolerant to moisture, alkalinity-pH and relative humidity during a 15 year period. Warranty includes repair and replacement of flooring products, coatings, primers and finishes applied over the control system surface and labor costs in the event of system failure during warranty period.
  - 1. Warranty shall commence from Date of Substantial Completion.
- B. Warranty shall not exclude foreign salts, admixtures, resin and silicate surface treatments or surface due to normal concrete movement. Installation deems acceptance of on-site conditions.

**PART 2 PRODUCTS**

2.1 PERFORMANCE REQUIREMENTS

- A. MVE-Control System Capabilities: Capable of suppressing MVE without failure where installed on concrete that exhibits the following conditions:
  - 1. MVER: Maximum 15 lb of water/1000 sq. ft. (6.80 kg of water/92.9 sq. m) when tested according to ASTM F1869.

2. Relative Humidity: Maximum 100 percent when tested according to ASTM F2170 using in situ probes.
- B. Water-Vapor Transmission: Through MVE-control system, maximum 0.10 perm (5.75 ng/Pa x s x sq. m) when tested according to ASTM E96/E96M.
- C. Tensile Bond Strength: For MVE-control system, greater than 200 psi (1.38 MPa) with failure in the concrete according to ASTM D7234.

## 2.2 MVE-CONTROL SYSTEM

- A. Manufacturers:
  1. Ardex Engineered Cements
    - a. Product: Ardex MC Rapid.
  2. Koster American Corp.
    - a. Product: VAP I 2000.
  3. Sika Corporation
    - a. Product: Sika MB.
  4. Stauf USA, LLC.
    - a. Product: ERP-270 Perma-Seal.
  5. Substitutions: None accepted.
- B. MVE-Control System: ASTM F3010 qualified, fluid-applied, two-component, epoxy-resin, membrane-forming system; formulated for application on concrete substrates to reduce MVER to level required for installation of floor coverings indicated and acceptable to manufacturers of floor covering products indicated, including adhesives.
  1. Substrate Primer: Provide MVE-control system manufacturer's concrete-substrate primer if required for system indicated by substrate conditions.
  2. Cementitious Underlayment Primer: If required for subsequent installation of cementitious underlayment products, provide MVE-control system manufacturer's primer to ensure adhesion of products to MVE-control system.

## 2.3 ACCESSORIES

- A. Patching and Leveling Material: Moisture-, mildew-, and alkali-resistant product recommended in writing by MVE-control system manufacturer and with minimum of 3000-psi (20.68-MPa) compressive strength after 28 days when tested according to ASTM C109/C109M.
- B. Crack-Filling Material: Resin-based material recommended in writing by MVE-control system manufacturer for sealing concrete substrate crack repair.
- C. Cementitious Underlayment: If required to maintain manufacturer's warranty, provide MVE-control system manufacturer's hydraulic cement-based underlayment.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for maximum moisture content, installation tolerances, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Installation of system indicates acceptance of surfaces and conditions.

#### **3.2 PREPARATION**

- A. Preinstallation Testing:
  - 1. Alkalinity Testing: Perform pH testing according to ASTM F710. Install MVE-control system in areas where pH readings are less than 7.0 and in areas where pH readings are greater than 8.5.
  - 2. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m) and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Anhydrous Calcium Chloride Test: ASTM F1869. Install MVE-control system in locations where concrete substrate MVER exceeds 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
    - b. Internal Relative Humidity Test: Using in situ probes, ASTM F2170. Install MVE-control system in locations where concrete substrates exhibit relative humidity level greater than 75 percent.
  - 3. Tensile-Bond-Strength Testing: For typical locations indicated to receive installation of MVE-control system, install minimum 100-sq. ft. (9.29-sq. m) area of MVE-control system to prepared concrete substrate and test according to ASTM D7234.
    - a. Proceed with installation only where tensile bond strength is greater than 200 psi (1.38 MPa) with failure in the concrete.
- B. Concrete Substrates: Prepare and clean substrates according to MVE-control system manufacturer's written instructions to ensure adhesion of system to concrete.
  - 1. Remove coatings and other substances that are incompatible with MVE-control system and that contain soap, wax, oil, or silicone, using mechanical methods recommended in writing by MVE-control system manufacturer. Do not use solvents.
  - 2. Provide concrete surface profile complying with ICRI 310.2R CSP 3 by shot blasting using apparatus that abrades the concrete surface with shot, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
  - 3. After shot blasting, repair damaged and deteriorated concrete according to MVE-control system manufacturer's written instructions.
  - 4. Protect substrate voids and joints to prevent resins from flowing into or leaking through them.
  - 5. Fill surface depressions and irregularities with patching and leveling material.
  - 6. Fill surface cracks, grooves, control joints, and other nonmoving joints with crack-filling material.

7. Allow concrete to dry, undisturbed, for period recommended in writing by MVE-control system manufacturer after surface preparation, but not less than 24 hours.
  8. Before installing MVE-control systems, broom sweep and vacuum prepared concrete.
- C. Protect walls, floor openings, electrical openings, door frames, and other obstructions during installation.

### 3.3 INSTALLATION

- A. Install MVE-control system according to ASTM F3010 and manufacturer's written instructions to produce a uniform, monolithic surface free of surface deficiencies such as pin holes, fish eyes, and voids.
  1. Install primers as required to comply with manufacturer's written instructions.
- B. Do not apply MVE-control system across substrate expansion, isolation, and other moving joints.
- C. Apply system, including component coats if any, in thickness recommended in writing by MVE-control system manufacturer for MVER indicated by preinstallation testing.
- D. Cure MVE-control system components according to manufacturer's written instructions. Prevent contamination or other damage during installation and curing processes.
- E. After curing, examine MVE-control system for surface deficiencies. Repair surface deficiencies according to manufacturer's written instructions.
- F. Install cementitious underlayment over cured membrane if required to maintain manufacturer's warranty and in thickness required to maintain the warranty.

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to perform installation inspections.
- B. Installation Inspections: Inspect substrate preparation and installation of system components to ensure compliance with manufacturer's written instructions and to ensure that a complete MVE-control system is installed without deficiencies.
  1. Verify that surface preparation meets requirements.
  2. Verify that component coats and complete MVE-control-system film thicknesses comply with manufacturer's written instructions.
  3. Verify that MVE-control-system components and installation areas that evidence deficiencies are repaired according to manufacturer's written instructions.
- C. MVE-control system will be considered defective if it does not pass inspections.

### 3.5 PROTECTION

- A. Protect MVE-control system from damage, wear, dirt, dust, and other contaminants before floor covering installation. Use protective methods and materials, including temporary coverings, recommended in writing by MVE-control system manufacturer.



- B. Do not allow subsequent preinstallation examination and testing for floor covering installation to damage, puncture, or otherwise compromise the MVE-control system membrane.

**END OF SECTION**

## **SECTION 09 22 16**

### **NON-STRUCTURAL METAL FRAMING**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Non-structural metal framing, including the following:
  - 1. Non-load bearing interior light gauge steel studs and furring.
  - 2. Ceiling and soffit suspension systems for interior gypsum board assemblies.
  - 3. Backing plates not provided by other trades for support of items attached to metal framing system.
  - 4. Supplementary parts and components, such as clips, fasteners, supplementary framing, and other miscellaneous accessories required for a complete installation.
- B. Related Sections:
  - 1. Rough carpentry: Section 06 10 00.
  - 2. Building thermal insulation: Section 07 21 00.
  - 3. Penetration firestopping: Section 07 84 13.
  - 4. Gypsum board: Section 09 29 00.

##### **1.2 SYSTEM DESCRIPTION**

- A. Delegated Design Requirements:
  - 1. Drawings of metal support system assemblies are diagrammatic and show design intent of finished profiles, shapes and forms; relationships between elements; location, identification, dimension and size of components, assemblies and accessories; and details and diagrams of connections.
  - 2. Unless otherwise indicated on the Drawings, engineer, fabricate, assemble, and install metal support systems to meet or exceed the criteria indicated; to conform to the profiles indicated; to satisfy applicable governing codes and regulations; and to provide structurally sound assemblies.
- B. Performance Requirements: Unless otherwise indicated on the Drawings, engineer assemblies to withstand the loads prescribed by the authorities having jurisdiction, within the specified deflection limits.
  - 1. Lateral loading: 5 psf for interior partitions; as prescribed for exterior walls.
  - 2. Limit metal framing systems deflection under load to the following:
    - a. L/240 where supporting gypsum board only.
    - b. L/360 where supporting tile.

### 1.3 ACTION SUBMITTALS

- A. Product Data: Include a list of proposed products and materials to be provided for complete assemblies, along with manufacturer's product data, specifications, typical installation details and other data for each material listed to prove compliance with the specified requirements.
- B. Shop Drawings: large scale, dimensioned shop drawings for Contractor-engineered assemblies.
  - 1. Show framing member size, thicknesses, number, type, location, and spacing.
  - 2. Indicate component details, framing layout, framed openings, anchorage to structure, bracing, type and location of fasteners and welds, and accessories required for related work.
  - 3. Show metal thicknesses, spacing of members and span dimensions.

### 1.4 INFORMATIONAL SUBMITTALS

- A. Manufacturer's Design Data: When not indicated on the Drawings submit complete load and deflection tables properly annotated for the indicated framing sizes, spacing, span limits and thicknesses to be used.
- B. Certificates:
  - 1. Mill certificates and galvanizing certificates: Signed by framing member/accessory manufacturer certifying compliance with material requirements.
- C. Manufacturer's Installation Instructions: Submit manufacturer-prepared instructions concerning the proper preparation and installation framing members and framing accessories.

### 1.5 QUALITY ASSURANCE

- A. Installer's Qualifications: Firm and individuals with a minimum of 3 consecutive years experience in the installation of specified products on projects similar in material, design, complexity and extent to this Project, and whose work has resulted in applications with a record of successful in-service performance.
- B. Regulatory Requirements: Where fire-resistive construction is indicated, provide materials, accessories, and application procedures listed by UL, or tested according to ASTM E 119 for the type of construction shown, and approved by the authorities having jurisdiction.

### 1.6 HANDLING

- A. Delivery: Protect materials from excessive moisture in shipment, storage, and handling.
- B. Storage: Store off ground, either in a dry, ventilated, enclosed space or protected with suitable waterproof coverings.
- C. Handling: Protect metal framing units from rusting and damage.

## 1.7 SEQUENCING

- A. Coordinate placement of concealed internal wall reinforcement, such as backing plates, blocking, etc. for items to be attached to metal support systems.
- B. Coordinate installation of ceiling and soffit suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorage to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.
- C. Furnish concrete inserts, door frames, and other devices indicated, to other trades for installation well in advance of time needed for coordination with other construction.

## **PART 2 PRODUCTS**

### 2.1 MANUFACTURERS

- A. Provide metal framing members from one of the following:
  - 1. MarinoWARE.
  - 2. SCAFCO Corporation.
  - 3. Clarkwestern Dietrich Building Systems LLC.
  - 4. Telling Industries.
  - 5. MBA Metal Framing.

### 2.2 STUDS, RUNNERS AND FURRING

- A. Framing Members - General: Comply with ASTM C 754 for conditions indicated.
  - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
  - 2. Protective Coating: ASTM A 653, G40.
- B. Smooth Steel Studs: ASTM C 645, punched web complying with the following:
  - 1. Protective coating: ASTM A 653, G40 galvanized coating.
  - 2. Bracing: Where the wall finish does not adequately brace both flanges of studs, provide bracing or reduce allowable stresses for computing stud heights in compliance with requirements of the authorities having jurisdiction.
  - 3. Uncoated Metal Thickness: Minimum 0.018 inch, refer to the Drawings.
- C. Dimpled Steel Studs and Runners:
  - 1. Protective coating: ASTM A 653, G40 galvanized coating.
  - 2. Bracing: Where the wall finish does not adequately brace both flanges of studs, provide bracing or reduce allowable stresses for computing stud heights in compliance with requirements of the authorities having jurisdiction.
  - 3. Uncoated Metal Thickness: Minimum 0.015 inch.
- D. Top and Bottom Tracks: As recommended by the manufacturer of each stud type and of the same thicknesses as the studs in same wall or partition, unless otherwise indicated on the Drawings. Provide unpunched, screwable tracks with 1-1/4-inch flanges.
- E. Slip-Type Head Joints: Where indicated, provide one of the following:

1. Slip-Type Head Joints: To accommodate slab deflection where studs extend to the underside of beams, floor or roof slabs, secure at top with a deep leg, minimum 0.063 inch slip connection.
- F. Furring Channels: Minimum 0.018 inch thick, galvanized, hat-shaped.
- G. Horizontal stiffener, runner channels and bridging: Complying with ASTM A 1003, minimum 0.053 inch metal thick, channels fabricated of cold-rolled steel with flanges not less than 7/16-inch wide. Minimum weights as follows:

Channel Size	Flange Width	Pounds/1000 linear foot
3/4-inch	7/16-inch	300
1-1/2-inch	7/16-inch	475
2-inch	19/32-inch	590

## 2.3 SUSPENSION SYSTEMS

- A. Tie Wire: ASTM A 641, Class 1 zinc coating, soft temper, minimum 0.062 inch diameter wire, or double strand of minimum 0.048 inch diameter wire.
- B. Wire: ASTM A 641, Class 1 zinc coating, soft temper:
1. Hanger Wire: Minimum 0.12 inch diameter, unless otherwise indicated.
  2. Diagonal Bracing Wire: 0.08 inch diameter, unless otherwise indicated.
  3. Tie wire: 0.05 inch diameter, single-strand annealed steel or 0.04 inch diameter, galvanized, double-strand annealed steel.
- C. Metal Channels Supporting Suspended Ceilings (Carrying Channels): Provide metal channels complying with ASTM C 641, galvanized in compliance with ASTM A 924, G60 coating designation, for framing, furring and stiffening, as follows:

Size	Type	Pounds per 1,000 linear feet
3/4 inch	Cold-rolled	300
1 inch	Hot-rolled	410
1-1/2 inches	Hot-rolled	475
2 inches	Cold-rolled	590

- D. Furring Channels (Furring Members):
1. Cold-Rolled Channels: 0.053-inch uncoated-steel thickness, with minimum 1/2 inch wide flanges, 3/4 inch deep.
  2. Steel Studs and Runners: ASTM C 645.
    - a. Minimum Base-Metal Thickness: minimum 0.033 inch.
    - b. Depth: As indicated on Drawings.
  3. Hat-Shaped, Rigid Furring Channels: ASTM C 645, 7/8 inch deep.
    - a. Minimum Base-Metal Thickness: Minimum 0.033 inch thickness>.
- E. Direct Hung Suspension System (Alternate Method):
1. Cross Tees: 1-1/2 inch high double web .020 inch thick electro-galvanized steel with 15/16 inch wide capped flange face.

2. Wall Track: 1-1/2 inch to 1-5/8 inch inside dimensions .020 inch thick electro-galvanized steel with 15/16 inch to 1 inch wide top and bottom flange faces.
3. Acceptable Products:
  - a. "Drywall Suspension System" (USG Corp.).
  - b. "System 640" (Rockwool International).
  - c. "Drywall Grid System" (Armstrong World Industries, Inc.).
- F. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

## 2.4 FASTENERS AND ACCESSORIES

- A. Fasteners for Steel Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates; length and thickness required by Code, or recommended by the metal framing manufacturer when not prescribed by Code.
- B. Shot pins: 0.140-inch diameter low velocity powder-actuated drive pins equivalent to Ramset/Red Head No. 1508, or other as approved by Architect, with 7/8-inch minimum penetration into concrete.
- C. Anchor bolts: ASTM A 307, non-headed type.
- D. Expansion shields: FS FF-S-325, except do not use lead, fiber and plastic shields.
- E. For low walls: stud reinforcement "Floor Anchor" (Pinquist Tool & Die Co., Inc.), at every stud.
- F. Isolation Strip at Exterior Walls - Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch thick, in width to suit steel stud size.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine adjacent construction and supports.
- B. Correct conditions detrimental to the proper and timely completion of this work before proceeding with installation.

### 3.2 PREPARATION

- A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.

1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.
- B. Coordination with Sprayed Fire-Resistive Materials:
  1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches o.c.
  2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

### 3.3 WALL INSTALLATION

- A. General:
  1. Erect metal framing systems in compliance with their manufacturer's recommendations, the reference standards, the Drawings and these Specifications.
  2. Use minimum 0.039 inch thick studs at the following locations:
    - a. Each side of door openings.
    - b. Where studs support backing plates, plumbing fixtures and wall-supported cabinets.
  3. Do not attach metal framing to ducts, conduits or pipes. Do not allow metal framing and suspension wires to contact pipes.
  4. Cut framing components squarely for a tight fit against abutting members. Erect framing plumb and level to provide solid backing for finish materials. Install steel studs in a wall/partition so that their flanges point in the same direction.
  5. Do not exceed a 1/8-inch in 10-foot deviation (non-cumulative) from true lines and levels, nor 1/4-inch from true position. Perform necessary remedial work on framing to achieve specified tolerances.
- B. Wall/Partition Framing:
  1. Layout partitions and permanently mark on slabs.
  2. Align and securely anchor ceiling and floor tracks to building construction. Space anchors within 6 inches of ends of each track segment and at 24 inches o.c. maximum. Do not drive fasteners closer than 2 inches to slab or curb edge.
  3. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
  5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.
  6. Frame openings in stud walls. Provide double studs, closer spacing, and additional reinforcement as detailed or required at doorframes, interior windows and recesses for equipment.
  7. Frame both sides of control joints in gypsum board surfaces with separate studs and a discontinuous runner; do not bridge the joint with system components or accessories.

8. Assemble corners using a minimum of 3 studs.
  9. Install studs in single length, without joints, extending from floor to underside of floor or roof structure above, except where indicated on the Drawings to stop at or above suspended ceilings. Splicing studs is not permitted without the Architect's approval.
  10. Where studs stop at or above suspended ceilings, unless otherwise indicated, brace every fourth stud (maximum) with opposite stud bracing at 45 deg angles securely anchored to the floor or roof above.
  11. Attaching studs to runner: Attach studs to tracks by friction fit for single stud gypsum board partitions.
  12. Attach the following studs to runner tracks with screws or with a crimping tool in compliance with the stud manufacturer's instructions, except where indicated to be welded.
    - a. Studs with gypsum board on only one side.
    - b. Studs on each side of doors.
    - c. Studs supporting wall hung plumbing fixtures.
    - d. Studs supporting wall hung urinal screens, toilet compartments, cabinets and equipment.
    - e. Attach corner studs, partition intersections, studs on each side of doorjamb, and other openings in walls/partitions as specified above.
  13. Unless otherwise indicated, provide horizontal stiffeners consisting of 3/4-inch channels spaced at not more than 54 inches o.c. maximum in partitions/walls supporting wall supported cabinets. Attach stiffeners to each stud.
    - a. Provide an additional 3/4-inch channel 6 inches above door head and extend 2 stud spaces beyond jamb studs.
    - b. Install channels in longest possible lengths, lap 12 inches and wire-tie at joints. Do not tie channels on opposite sides of staggered and double stud partitions together.
  14. Double studs (face to face to form a tube) at locations adjacent to doors and openings. Extend studs at door openings to slab or deck above and anchor securely to bottom track (as specified in subparagraph 12.b. above) and to top slab or deck with clip angles.
    - a. Locate additional studs not more than 2 inches from door and window frames, abutting partitions, partition corners, and other construction.
    - b. Install a section of track over door and window frames with a clip angle at each end and attach securely to the adjacent vertical studs.
    - c. Install cut-to-length studs at the location of vertical joints and at standard spacing over the doorframe header extending to the ceiling track.
  15. Install studs 2 inches away from abutting concrete, steel columns or other structural elements. Extend the horizontal stiffeners and attach it to the structural element.
  16. Provide additional framing, as required, for attachment of electrical boxes, fire extinguisher cabinets and similar items located in stud walls.
- C. Furring:
1. Provide furring attached to concrete and metal framing to conceal utilities, furred soffits, and other furring as indicated.
  2. Furring to receive gypsum board shall be screw-on channels directly attached to backing material, or applied over runner channels as applicable.



3. Furring to receive plaster shall be 3/4-inch cold-rolled channels wire tied to 1-1/2-inch runner channels.
  4. Space furring as indicated for studs.
- D. Install extra stud, furring members and angle runners at terminations of gypsum board work, and at openings and where required for support of other work occurring in the gypsum board work.
1. Install sheet metal strapping, studs, hat-shaped channels or stud runners in walls where shown on the Drawings or as required by the conditions of the installation, minimum same thickness as stud framing, for the support and attachment of other work. Attach to stud framing with not less than three screws per stud.

### 3.4 INSTALLING CEILING & SOFFIT SUSPENSION SYSTEMS

- A. Install suspension system components in sizes and spacings indicated on Drawings, but not less than those required by referenced installation standards for assembly types and other assembly components indicated.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.
- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
    - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices. Do not attach wires to, or bend around, interfering material such as ductwork, pipes and conduits
    - a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards.
  3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  4. Do not attach hangers to steel roof deck.
  5. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
  6. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
  7. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

- E. Attach perimeter wall track or angle where grid suspension systems meet vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.
- F. Space main runners not over 4 feet O.C. in any dimension so that hanger wires do not support more than 12 square foot of ceiling.
- G. Hang suspended framing independent of walls, columns, pipes, ducts, and conduits, and their insulation.
- H. Space runner channels not more than 6 inches from parallel walls or beams.
  - 1. Align runner channels accurately relative to indicated ceiling height and saddle-tie with hanger wires.
  - 2. Lap channels 12 inches at splices and tie at each end of lap.
- I. Attach furring channels to runner channels at right angles to carrying channels with clips or with 0.05 inch diameter tie wire with triple wrap and triple twist.
  - 1. Space at not over 12 inches O.C. for lath/plaster assemblies, and 16 inches O.C. for gypsum board.
  - 2. Locate approximately 2 inches from parallel walls.
  - 3. Lap channels 12 inches at splices and wire-tie at each end of lap.
  - 4. Assemble and install metal grillage so that it is rigid, square, and free of movement, and level within the tolerances specified.
  - 5. At control joints, provide discontinuous lap in main runners occurring over joints.
    - a. Do not bridge joints with cross furring where joints run perpendicular to furring.
    - b. Where joints run parallel to furring, provide furring to support each side of joint.
- J. Provide recesses and openings where indicated for lighting fixtures, registers, access panels and other items to be installed in ceilings. Provide additional furring channels where required by opening condition.
- K. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

**END OF SECTION**

## **SECTION 09 29 00**

### **GYPSUM BOARD**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Gypsum board, including the following:
  - 1. Interior gypsum board.
  - 2. Tile backer board.
  - 3. Gypsum sheathing board.
- B. Sound Barrier Mullion Trim Cap.
- C. Trims, installation accessories, and finishing materials.
- D. Related Sections:
  - 1. Rough carpentry: Section 06 10 00.
  - 2. Building thermal insulation: Section 07 21 00.
  - 3. Penetration firestopping systems: Section 07 84 13.
  - 4. Joint firestopping: Section 07 84 43.
  - 5. Joint sealants: Section 07 92 00.
  - 6. Non-load bearing metal framing: Section 09 22 16.
  - 7. Hollow metal doors and frames: Section 08 11 13.
  - 8. Painting: Section 09 91 00.

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

- A. Product Data: For each type of product indicated.
- B. Samples:
  - 1. 12 inch long samples of corner bead, end bead, reglets, moldings and control joint trim.
  - 2. Sample of electrical box pad.

##### **1.3 QUALITY ASSURANCE**

- A. Provide gypsum board construction complying with laws, ordinances, rules, regulations and orders of public authorities having jurisdiction over this part of the Work.
- B. Provide primary materials from a single manufacturer unless otherwise approved, in writing by the Architect, to insure total unit responsibility.
- C. Gypsum Board:

1. Provide installation of gypsum board materials and systems construction complying with ASTM C 840, the manufacturer's current printed instructions and specifications and Gypsum Association, Standard GA 216 - Recommended Specifications for the Application and Finishing of Gypsum Wall Board, and Standard GA 600 - Fire Resistance Design Manual, current editions, except as herein modified and as approved by the manufacturer.
  2. In the event of a conflict between these specifications and the referenced standards, the more stringent or greater is to be utilized for the installation.
- D. Fire Resistive Construction:
1. For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
  2. Where gypsum board systems are indicated to have fire resistance ratings, including those required to comply with governing regulations, provide materials and installations identical with applicable assemblies which have been tested and listed by recognized authorities, including UL.
  3. Deflection and Firestop Track: Provide top runner in fire resistance rated assemblies indicated as labeled and listed by UL, Warnock Hersey, or another testing and inspecting agency acceptable to authorities having jurisdiction.
- E. Sound Transmission Characteristics: Provide materials and construction identical to those tested in the assembly indicated in accordance with ASTM E 90 and classified according to ASTM E 413 by a qualified independent testing agency.
1. Provide assemblies designed and pretested to achieve the minimum ratings as indicated on the Drawings.
- F. Comply with the seismic requirements of the local codes, ordinances, and regulations.
- 1.4 STORAGE AND HANDLING
- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other damage. Stack panels flat to prevent sagging.
- 1.5 PROJECT CONDITIONS
- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and environmentally conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

## **PART 2 PRODUCTS**

### **2.1 ACCEPTABLE GYPSUM BOARD MANUFACTURERS**

- A. Georgia-Pacific Corp.; Portland, OR 97204.
- B. Continental Building Products Inc., Herndon, VA 20170.
- C. National Gypsum Company, Charlotte, NC 28211.
- D. United States Gypsum Co.; Chicago, IL 60680.
- E. Certainteed Corporation, Valley Forge, PA 19482.

### **2.2 GENERAL - PANELS**

- A. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

### **2.3 GYPSUM PANELS**

- A. Gypsum Board: Complying with ASTM C 1396, regular, Type X or Type C, tapered with beveled or radial edge for finished joints, thickness as shown on the Drawings.
- B. Gypsum Ceiling Board: Complying with ASTM C 1396, tapered with beveled or radial edge for finished joints, 1/2 inch thickness, regular and Type X (fire-rated).
- C. Exterior Gypsum Soffit Board: Complying with ASTM C 1396, tapered edge for finished joints, thickness as shown on the Drawings, regular and Type X (fire-rated).
- D. Gypsum Sheathing Board: Unless noted on the Drawings, or specified otherwise, provide one of the following at the Contractor's option:
  - 1. Glass-Mat Faced Gypsum Exterior Sheathing Board: Complying with ASTM C 1177 and ASTM D 3273, regular, 1/2 inch thick, (Type X, 5/8 inch thick where required to be fire-rated), provide one of the following:
    - a. "Dens-Glass Gold Exterior Sheathing and Dens-Glass Gold Exterior Fireguard Sheathing" (Georgia-Pacific).
    - b. "Glasroc Sheathing" (Certainteed).
    - c. "EXP Sheathing and EXP Fire-Shield Sheathing" (National Gypsum).
  - 2. Paperless (No Facing) Gypsum Sheathing Board: Sheathing Board: Complying with ASTM C 1177, ASTM C 1396 and ASTM D 3273, regular, 1/2 inch thick, (Type X, 5/8 inch thick where required to be fire-rated), "Aqua Tough Fiberrock Exterior Sheathing" (USG) or other as approved by Architect.

### **2.4 TILE BACKER BOARD**

- A. Provide at shower walls, bath tub bulkheads, wet walls and other walls indicated on the Drawings. Unless noted on the Drawings, or specified otherwise, provide one of the following at the Contractor's option:
  - 1. Cementitious Board: Fiberglass mesh reinforced portland cement aggregate water resistant mixture formed boards, 1/2 inch thick, complying with ASTM C 1325 and ANSI A118.9, one of the following:
    - a. "Durock" (USG, Chicago, IL 60680).

- b. "Wonder-Board" (Custom Building Products, Seal Beach, CA 90740).
  - c. "Util-A-Crete" (Fin Pan, Inc., Hamilton, OH 45012).
  - d. "Perma Base" (National Gypsum).
2. Glass Mat Faced Water Resistant Gypsum Tile Backer Board Complying with ASTM C 1178 and ASTM D 3273, regular, 1/2 inch thick, (Type X, 5/8 inch thick where required to be fire-rated, provide one of the following:
- a. "Dens-Shield Tile Backer" (Georgia-Pacific).
  - b. "GlasRoc DiamondBack Tile Backer" (CertainTeed).
  - c. "e<sup>2</sup>XP® Tile Backer" (National Gypsum).

## 2.5 SOUND BARRIER MULLION TRIM CAP

- A. Partition End Fillers: Install compressible filler continuously between window wall mullion and gypsum board partition end filler panels, maintaining a min. of 3/4 in. (19mm) spacing to allow for curtain wall deflection. Utilize self adhesive to position end fillers on curtain wall mullion. Adhesively apply compressible filler continuously from floor to ceiling including underside of soffit. Do not penetrate curtain wall mullion with any type of fastenings. Prior to installing partition studs or vertical support members, apply adhesive to side facing partition to allow for two-sided adhesion and a continuous seal.
- B. General: Provide metals free from surface blemishes where exposed to view in finished unit. Surfaces that exhibit pitting, seam marks, roller marks, stains, and discolorations, or other imperfections on finished units are not acceptable. All metal shall be of the highest-grade commercial type.
- C. Manufacturers:
  - 1. Basis of Design: MullionMate as manufactured by Gordon Interior Specialties.
  - 2. Alternative Manufacturers:
    - a. Mull-It-Over.
- D. STC: minimum 58.
- E. Aluminum Extrusions:
  - 1. 6063-T5 temper, tensile strength 31 KSI ASTM B 221.
  - 2. Thickness: 0.125 inches minimum.
  - 3. Profile: As selected and approved by Architect to allow solid attachment and fastening to the partition wall framing.
- F. Sound Absorbing Foam:
  - 1. Resistant to smoke, flame, and microbial growth.
  - 2. Fire Rating: ASTM E 84 Class 1.
  - 3. Fungi Resistance: Zero rating per ASTM G 21.
- G. Fasteners:
  - 1. Self Tapping or appropriate threaded fastener.
  - 2. Compatible with all materials fasteners will contact with and not causing galvanic corrosion.
- H. Snap Cover: Snap-on fastener cover.
- I. Acoustical Sound Sealant: Acrylic latex based.
- J. Finish: Anodized or powder-coated to match existing window mullion.

1. Color: Match color of mullion.

## 2.6 TRIM ACCESSORIES

- A. Interior Trim: Comply with ASTM C 1047.
  1. Material: Paper faced galvanized steel sheet or rigid PVC.
  2. Shapes:
    - a. Cornerbead.
    - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
    - c. Control (expansion) joint.
    - d. Tear-Away Bead: L-Shaped, exposed long flange receives joint compound.
  3. Reveal Molding: Extruded aluminum alloy 6063 T5, with (mill) clear anodized finish, AAC12C22A21, standard lengths, "Type WDM-50-75" (Fry Reglet) or other approved by Architect. Width of reveal as shown on the Drawings.
- B. Foam Gaskets: Closed cell vinyl foam adhesive backed strips that allow fastener penetration without foam displacement, thickness as indicated on the Drawings, in width to suit metal stud size indicated on the Drawings.
- C. Control Joints: Roll formed zinc or extruded vinyl as standard with the board manufacturer.
- D. Preformed Cyclorama Panels
  1. Material: Preformed High-Impact ABS Plastic Modules
    - a. Shapes
      - 1) Radiused floor cove modules
      - 2) non-parabolic corner module
      - 3) vertical corner modules
  2. Basis of Design: Super 2.5-EZ, Pro Cyc Inc, Clackamas, OR 97015
- E. Aluminum Trim: Extruded accessories of profiles and dimensions indicated.
  1. Aluminum: Alloy and temper with not less than the strength and durability properties of ASTM B221 (ASTM B221M), Alloy 6063-T5.
  2. Basis of Design: Fry Reglet Corp.
  3. Alternate Manufacturers:
    - a. Gordon, Inc.
    - b. Pittcon Industries.
  4. Profile: As indicated on Drawings.
  5. Finish: Corrosion-resistant primer compatible with joint compound and finish materials specified.

## 2.7 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475.
- B. Joint Tape:
  1. Interior Gypsum Board: Paper.
- C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.
  1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.

2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying type, all-purpose compound.
    - a. Use setting type compound for installing paper faced metal trim accessories.
  3. Fill Coat: For second coat, use drying type, all-purpose compound.
  4. Finish Coat: For third, coat, use drying type, all-purpose compound.
- D. Sheathing Joint and Penetration Treatment Materials:
1. Sealant for Glass Mat Gypsum Sheathing Board: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing, and recommended by tape and sheathing manufacturer for use with fiberglass sheathing tape and for covering exposed fasteners.
  2. Sheathing Tape for Glass Mat Sheathing Board: Self-adhering fiberglass tape, minimum 2 inches wide, 10 by 10 or 10 by 20 threads/inch, of type recommended by sheathing and tape manufacturer for use with silicone emulsion sealant in sealing joints and penetrations in glass mat gypsum and paper faced sheathing board and with a history of successful in-service use.

## 2.8 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.
- C. Use screws complying with ASTM C 954 for fastening panels to steel members from 0.033 to 0.112 inch thick.
- D. Screws:
1. Metal Studs: Type S and S-12 bugle head and pan head, sized to suit thickness, zinc plated for exterior use, complying with ASTM C 1002 and ASTM C 954.
  2. Wood Studs: Type W, 1-1/4 inch long or Type S bugle head and pan head, sized to suit thickness, zinc plated for exterior use, complying with ASTM C 1002 and ASTM C 954.
  3. Gypsum: Type G, sized to suit thickness, zinc plated for exterior use, complying with ASTM C 1002 and ASTM C 954.
  4. Gypsum Sheathing: Provide size, type, material and finish as recommended by gypsum sheathing manufacturer for substrates indicated.
  5. Provide fasteners with a hot-dip zinc coating complying with ASTM A 153.
  6. Fastening to Metal Studs: Use 1-1/2 inches long, galvanized screws.
- E. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
1. Fire Resistance Rated Assemblies: Comply with mineral fiber requirements of assembly.
- F. Acoustical Sealant: As specified in Section 07 92 00 – Joint Sealants
- G. Electrical Box Pads: Moldable Polybutene pads, minimum 1/8 inch thick, , provide on the following:
1. "Lowery's Electrical Box Pads" (Harry A. Lowery & Associates, Inc., Sun Valley, CA 91352).



2. "3M Putty Pads" (3M Fire Protection Products, St. Paul, MN 55144).
  3. "Series SSP" (Specified Technologies Inc., Sommerville, NJ 08876).
- H. Spot Grout: Joint treatment compound as recommended by the manufacturer for spot grouting hollow metal door and window frame anchors, complying with ASTM C 475.
- I. Surfer: "Sheetrock Brand Tuff-Hide" (USG).

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 PREPARATION**

- A. When the outside temperature is below 55 deg F, provide heat and maintain in areas where the work is to be performed. Provide heat continuously and uniformly at 55 deg F from one week prior to start of installation until gypsum board application and joint treatment is completed. Do not start installation until windows are glazed and doors installed or openings temporarily closed. Provide ventilation to remove excess moisture during joint treatment.
- B. Coordination with Sprayed Fire Resistive Materials: After sprayed fire resistive materials are applied, remove them only to extent necessary for installation of gypsum board assemblies and without reducing the fire resistive material thickness below that which is required to obtain fire resistance

#### **3.3 INSTALLATION - GENERAL**

- A. Comply with ASTM C 840.
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or backing is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4 to 3/8 inch wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, including floors. Provide 1/4 to 1/2 inch wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- I. Spot-Grouting: At hollow metal door and window frames spot-grout each jamb anchor, filling the inside face of the jamb at each anchor.
- J. STC Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with manufacturer's written recommendations for locating edge trim and closing off sound flanking paths around or through assemblies, including sealing partitions above acoustical ceilings. Separate by 24 inches horizontally outlet boxes and other penetrations on opposite sides of the partition in separate stud cavities and treat with outlet box pads.
- K. Install sound attenuation blankets, where shown on the Drawings, pressure fit between studs. Fill voids. Openings and gaps, butt joints of blankets and support and secure in accordance with manufacturer's recommendation when not self-supporting.

### 3.4 APPLYING INTERIOR GYPSUM BOARD

- A. Single Layer Application:
  - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
  - 2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated or required by fire resistance rated assembly, and minimize end joints.
    - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    - b. At stairwells and other high walls, install panels horizontally, unless otherwise indicated or required by fire resistance rated assembly.
  - 3. Fastening Methods: Apply gypsum panels to supports with steel drill screws.
- B. Multilayer Application:

1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire resistance rated assembly. Stagger joints on opposite sides of partitions.
2. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

### 3.5 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install controls joints in accordance with the following:
  1. Install control joints according to ASTM C 840.
  2. In specific locations as drawn for visual effect.
  3. Where a partition, wall, or ceiling traverses a construction joint (expansion, seismic, or building control element) in the base building structure.
  4. Where a wall or partition runs in an uninterrupted straight plane exceeding 30 lineal feet.
  5. Interior Ceilings with Perimeter Relief: Install control joints so that linear dimensions between control joints does not exceed 50 ft and total area between control joints does not exceed 2,500 sq. ft. Install a control joint or intermediate blocking where ceiling framing members change direction.
  6. Interior Ceilings without Perimeter Relief: Install control joints so that linear dimensions between control joints does not exceed 30 ft and total area between control joints does not exceed 900 sq. ft. install a control joint or intermediate blocking where ceiling framing members change direction.
- C. Interior Trim: Install in the following locations:
  1. Cornerbead: Use at outside corners, unless otherwise indicated.
  2. LC-Bead: Use at exposed panel edges.
  3. Tear-Away Bead: Use at exposed panel edges.
- D. Apply gypsum board screws with an electric driver. Drive screws not less than 3/8 inch from edges or ends of panels to provide a uniform dimple not over 1/32 inch deep.
- E. Cyclorama: Install preformed cyclorama modules in accordance with the following:
  1. Follow manufacturer's instructions for installation and finishing of modules
  2. Clean and prep all surfaces prior to installation.
  3. Prepare preformed modules for installation before assembly by sanding and cleaning each module with damp cloth.
  4. Install plywood where preformed modules meet the wall, horizontally and vertically for attachment of modules.
  5. Regularly remove debris and dust from modules to assure clean surface and tight fit.
  6. Use fiberglass mesh tape on joints between preformed modules and the wall/floor, do not use this tape at joints between modules.
  7. Allow joint compound to completely dry prior to applying additional coats.

8. Use a minimum of three coats of joint compound, sanding and cleaning after each coat, to achieve the desired, seamless finish.
9. Prime and paint with manufacturer's recommended primer and paint as required for the substrate. Color, finish and sheen to match on walls, preformed panels and floor of cyclorama.

### 3.6 INSTALLATION OF TILE BACKER BOARD

- A. Install tile backer board on walls to receive ceramic and/or stone tile; on plumbing fixture wet walls, in toilet areas, shower areas, baths, showers and bath tub surrounds and other wet area walls shown on the Drawings. Install cementitious backer units and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.
- B. Support ends of boards over framing. Fasten boards to studs with 1-1/4 inch long screws spaced 16 inches o.c. and at perimeter 8 inches o.c. not less than 3/8 inch nor more than 5/8 inch for board edges.
- C. Prefill joints with latex-portland cement mortar, then embed backer board manufacturer's or manufacturer approved tape and level the joints.
- D. Install water resistant gypsum board of the same thickness above tile backer board on walls with ceramic tile wainscot and full height on other walls in toilet rooms and wet areas.

### 3.7 INSTALLATION OF EXTERIOR GYPSUM SHEATHING

- A. Comply with GA-253 and with manufacturer's written instructions.
- B. General: Fasten exterior gypsum sheathing to stud framing for exterior walls. Space fasteners as recommended by gypsum sheathing manufacturer. Keep perimeter fasteners 3/8 inch from edges and ends of board units. Fit boards tightly against each other and around openings.
- C. Install sheathing vertically with long edges parallel to and centered over studs. Provide solid framing wherever end joints do not bear against framing sills or plates. Fasten to each support in accordance with manufacturer's recommended spacing, but not more than the following:
  1. Space fasteners not more than 4 inches o.c. around perimeter at edge and end supports.
  2. Space 8 inches o.c. at intermediate supports.
- D. Seal sheathing joints and penetrations in accordance with the sheathing manufacturer's written instructions.

### 3.8 INSTALLATION OF ELECTRICAL BOX PADS

- A. Install acoustical electrical box pads over electrical and other type of device boxes in sound rated walls, including but necessarily limited to electrical junction boxes, electrical switch boxes, power outlet receptacle boxes, thermostat control boxes, telephone outlet boxes and television cable or antenna outlet boxes.
- B. Install in accordance with the printed installation instructions of the manufacturer.

- C. Brush or wipe dust and dirt from box surface. If surface is contaminated with oil or other material that would impair pad application, wipe with Xylene or Toloulene to remove.
- D. Center pad on back of box and mold around conduit or cable entering box. Mold pad around sides covering openings.

### 3.9 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  - 1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  - 2. Level 2: Panels that are substrate for tile.
  - 3. Level 4: At panel surfaces that will be exposed to view, unless otherwise indicated.
  - 4. Level 5: At Cyclorama, areas as indicated on drawings

### 3.10 CLEANING AND PROTECTION

- A. Take precautions to minimize spattering of joint treatment compounds and other materials on other work. Remove joint treatment compounds promptly from doors, frames, glass and other finishes and surfaces that could be stained or marred by these materials. Clean floors of gypsum board materials and treatment compounds upon completion of the gypsum board work. At completion of work, remove unused materials, scraps, containers and equipment. Remove dust accumulated during finishing operations, leave areas broom clean, ready for painting, wall covering, ceramic tile or other finishes.
- B. Provide temporary protection of finish surfaces in areas of high traffic and susceptible to damage from work of others. Maintain protection throughout the construction period so that the work will be without damage or deterioration at the time of Substantial Completion. Repair or replace any damaged work. Remove temporary protection at completion of work or when required for completion of other work.
- C. Remove and replace panels that are wet, moisture damaged, and mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

### 3.11 SCHEDULE OF LOCATIONS

- A. Install gypsum board in the following locations:

1. Gypsum Board: Vertical and horizontal surfaces, unless otherwise indicated.
2. Gypsum Board Type X & C: Where required for fire resistance rated assembly.
3. Gypsum Board Type X: Interior face of cold formed metal framing exterior walls.
4. Abuse Resistant Gypsum Board: Where indicated on the Drawings.
5. Gypsum Ceiling Board: Ceilings unless noted otherwise.
6. Exterior Gypsum Soffit Board: Exterior soffits.
7. Gypsum Sheathing Board: Where indicated on the Drawings.
8. Tile Backer Board: Substrate for tile.
9. Water Resistant Gypsum Board: Toilet, bath, and wet area walls, not covered by tile.

**END OF SECTION**

**SECTION 09 51 00**  
**ACOUSTICAL CEILINGS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Acoustical ceiling panels and suspension systems including, intermediate support framing when required by the conditions of the installation.
- B. Related Sections:
  - 1. Gypsum board: Section 09 29 00.

**1.2 ACTION SUBMITTALS**

- A. Product Data: For each type of product.
- B. Samples:
  - 1. 12 inch square acoustical units for each type of unit.
  - 2. 1 foot-0 inch lengths of each suspension system components with manufacturer's standard color selections.
  - 3. 1 foot-0 inch lengths of edge trim system, with manufacturer's standard color selections.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Product Test Reports: For each acoustical panel ceiling, for tests performed by a qualified testing agency.
- B. Evaluation Reports: For each acoustical panel ceiling suspension system and anchor and fastener type, from ICC-ES.
- C. Coordination Drawings:
  - 1. Layout and details of acoustical ceilings.
  - 2. Show locations of items which are to be coordinated with, located in or supported by the ceilings.

**1.4 QUALITY ASSURANCE**

- A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
  - 1. Standard for Ceiling Suspension System Installations: Comply with ASTM C 636.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.

- C. Installer Qualifications: Engage an experienced installer who has completed acoustical panel ceilings similar in material, design, and extent to that indicated for this project and with a record of successful in-service performance.
- D. Source Limitations for Ceiling Units and Suspension Systems: Obtain each acoustical ceiling panel and suspension system from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

#### 1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver unopened materials to the project site in manufacturer's unopened containers, clearly indicating manufacturer's name, brand, type, style, size, color, texture and other identifying information.
- B. Store materials in a dry location, off the ground and in a manner to prevent damage, deterioration and intrusion of foreign matter. Replace materials which have been damaged or are otherwise unsuitable. When ascertained, immediately remove damaged or otherwise unsuitable material from the project site.

#### 1.6 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Do not install acoustical ceilings until space has been enclosed and is weathertight, and until wet work in the space has been completed and is nominally dry, and until work above ceilings has been completed, and until ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.
- B. Sequencing: Coordinate with the work of trades above the ceiling and penetrating or supported by it. Do not start work until appropriate work above the ceiling is complete.
- C. Coordination: Coordinate with electrical, HVAC and fire protection trades to ensure edge configuration of light fixture, air diffusers and sprinkler heads to penetrate or to lay in ceilings are proper for the system and provide system layout that accommodates lighting pattern.

### **PART 2 PRODUCTS**

#### 2.1 ACCEPTABLE MANUFACTURERS

- A. Armstrong World Industries, Inc., Lancaster, PA 17603.
- B. CertainTeed Corporation, Valley Forge, PA 19482.
- C. Rockwool, LLC, Chicago, IL 60638.
- D. United States Gypsum, Chicago, IL 60606.



## 2.2 CEILING PANELS

- A. Acoustical Panels (24 inch x 24 inch, Lay-in): Mineral fiber acoustical panels; nominal 24 inch x 24 inch units not less than 3/4 inch thick, with narrow reveal edge with corner bevel, and factory applied washable white finish.
  - 1. Basis of Design Product: Subject to compliance with requirements, provide products indicated on drawings or comparable products as approved by Architect.

## 2.3 CEILING SUSPENSION SYSTEM MATERIALS

- A. General: Comply with ASTM C 635 intermediate duty and heavy duty, as applicable to the type of suspension system required for the type of ceiling units indicated. Coordinate with other work supported by or penetrating through the ceiling, including light fixtures, HVAC equipment sprinklers and partition system.
- B. Attachment Devices: Size for 5 times the design load indicated in ASTM C 635, Table 1, direct hung. Coordinate types of devices compatible with floor construction, verify with precast concrete plank manufacturer.
- C. Hanger Wires: Galvanized carbon steel, ASTM A 641, soft tempered, pre-stretched, yield stress load of at least three (3) times design load, but not less than 12 gage (0.016 inch).
- D. Edge Molding: Zinc coated steel or aluminum, configurations shown on the Drawings, or if not shown manufacturer's standard for system with baked enamel finish to match suspension systems.
- E. Exposed Grid Suspension Systems: Direct hung, intermediate duty, double web, snap grid, exposed main runners, cross runners 9/16 inch wide, 1/4 inch bolt slot reveal and accessories, with exposed cross runners and wall trim coped to lay flush with main runners with factory applied baked enamel (white) finish, one of the following:
  - 1. Basis of Design Product: Armstrong; SILHOUETTE® XL® 1/4" Reveal Slotted Tee Suspension System
- F. Cold-Rolled Intermediate Support Channels: Minimum 1-1/2 inch, 475 lbs. per 1,000 lin. ft., complying with ASTM A 1008.

# PART 3 EXECUTION

## 3.1 INSPECTION

- A. Examine surfaces to receive the parts of the Work specified herein. Verify dimensions of in-place and subsequent construction. Application or installation of materials constitutes acceptance of the supporting construction.

## 3.2 INSTALLATION OF MECHANICAL GRID SUSPENSION SYSTEM

- A. Install suspension system in accordance with ASTM C 636 and current AIMA recommended procedures.
- B. System Installation:

1. Unless otherwise shown on the Drawings or required by the systems manufacturer's printed installation instructions, install hangers 4 ft. o.c. in rows 4 ft. apart.
  2. Do not attach hangers to steel roof deck. Attach hangers to structural members or intermediate support channels.
  3. Furnishing inserts and intermediate support framing and directing placement of inserts and framing is the responsibility of the acoustical ceilings installer.
  4. Where supporting construction is steel, wrap the wire hanger around or through the steel member or attach by other secure methods.
  5. Wrap hanger around carrying channel, or if directly suspended, insert through hole in main tee and secure hanger with at least three (3) turns around itself.
  6. Intermediate Support Channels:
    - a. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with the location of hangers at spacings required to support standard suspension system members, or where spacing of primary support does accommodate hanger spacing, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications
    - b. When required by the conditions of the installation, install intermediate support cold-rolled channels spaced not more than 4 feet-6 inches above direct hung ceiling grid system.
    - c. Grid Clips: Install ceiling manufacturer's standard grid clips attached to cold-rolled channels and direct hung ceiling grid system not more than 4 feet-0 inches o.c.
  7. Ceiling Grid: Install direct hung ceiling grid system to the ceiling panel model sizes shown on the Drawings and in accordance with the manufacturer's printed installation instructions.
- C. Coordinate spacing of hangers, carrying channels, runners, and molding with the location of ductwork, piping, conduit, electrical fixtures and other items occurring in or on ceilings.
- D. Provide additional hangers at corners of light fixtures at midpoint of cross tees adjacent to light fixtures and duct outlets and adjacent to main tee splices.
- 3.3 INSTALLATION OF PANELS
- A. Install acoustical panels in coordination with suspension system with edges concealed by support of suspension members and faces flush with grid webs. Arrange acoustical units and orient directionally patterned units in the configurations shown on the reflected ceiling plans and as directed by the Architect.
  - B. Scribe or cut panels to fit accurately at penetrations.
  - C. Use procedures that will minimize damage or soiling of the units during installation. Replace units which are damaged or cannot be adequately cleaned, as directed by the Architect at no additional cost to the Owner.
  - D. Provide ceiling panel manufacturer's standard hold-down (retention) clips where shown or noted on the Drawings, or where required by conditions of the installation.

3.4 ERECTION TOLERANCES

- A. Suspended Ceilings: Install main and cross runners level to a tolerance of 1/8 inch in 12 feet, non-cumulative.
- B. Moldings and Trim: Install moldings and trim to substrate and level with ceiling suspension system to a tolerance of 1/8 inch in 12, non-cumulative.

3.5 CLEANING AND PROTECTION

- A. Upon completion of the Work remove unused materials, debris, containers and equipment from the project site. Clean and repair floors, walls and other surfaces that have been stained, marred or otherwise damaged by work under this Section.
- B. Protect acoustical ceilings during the construction period so that they will be without any indication of deterioration or damage at the time of acceptance by Owner.

**END OF SECTION**

**SECTION 09 65 13**  
**RESILIENT WALL BASE**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Resilient wall base, including installation materials.
- B. Related Sections:
  - 1. Gypsum board: Section 09 29 00.
  - 2. Resilient tile flooring: Section 09 65 19.
  - 3. Carpet tile: Section 09 68 13.

**1.2 ACTION SUBMITTALS**

- A. Samples: Chain sets for color selection.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's Literature: Materials description, installation and maintenance instructions.

**1.4 QUALITY ASSURANCE**

- A. Installer Qualifications: Engage an experienced installer, with not less than 5 consecutive years experience, to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.
- B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

**1.5 DELIVERY, STORAGE AND HANDLING**

- A. Receive materials in undamaged condition as packaged by the manufacturer with manufacturer's seals and labels intact.
- B. Store materials at the job site within the building and in a dry place at least 24 hours before installing flooring materials. Maintain space temperature not be less than 70 deg F nor more than 90 deg F.
- C. Immediately removed from the job site damaged or otherwise unsuitable material, when so ascertained.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- A. Resilient Base:
  - 1. Rubber: Complying with ASTM F 1861, Type TS, Group 1 or 2, .080 gage, coved in resilient flooring areas and straight in carpeted areas, set-on type.
  - 2. Lengths: Coils in manufacturer's standard length.
  - 3. Base types, heights, colors, products and manufacturers are indicated on the Drawings.
  - 4. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Armstrong World Industries, Inc.
    - b. Johnsonite.
    - c. Roppe Corporation, USA.
- B. Rubber Molding Accessories
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Armstrong World Industries, Inc.
    - b. Johnsonite.
    - c. Roppe Corporation, USA.
- C. Adhesive: Water and alkali resistant, complying with recommendations of resilient flooring manufacturer.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION**

- A. Mix and apply adhesive as recommended by the manufacturer. Cover surface evenly. Do not exceed the maximum working area of the material. Install base within time limits recommended. If adhesive films over or dries, remove the adhesive and recoat the area.
- B. Firmly adhere resilient base to walls, columns, and permanent bases. Use longest lengths practical. Scribe bases accurately to abutting surfaces.
  - 1. Form internal and external corners and end stops with preformed units.
  - 2. Corners may be hand formed if method is approved by the Architect.
    - a. Form Outside Corners without producing discoloration (whitening) at bends.
    - b. Miter or cope corners to minimize open joints.
- C. Remove excessive adhesive in accordance with manufacturer's instructions.

3.2 CLEANING

- A. Not less than 4 days after flooring installation, clean base. Wash thoroughly, with a cleaner recommended by the manufacturer, in accordance with manufacturer's printed instructions.

**END OF SECTION**

**SECTION 09 65 19**  
**RESILIENT TILE FLOORING**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Polyurethane / Biobased floor tile.

**1.2 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data: For each type of product specified.
  - 2. Samples for Verification: Full-size tiles of each different color and pattern of resilient floor tile specified, showing the full range of variations expected in these characteristics.
- B. Informational Submittals:
  - 1. Test Reports: Pre-installation substrate moisture and alkalinity tests.
  - 2. Qualification Data: For qualified Installer.
- C. Closeout Submittals:
  - 1. Maintenance Data: For resilient floor tile to include in the maintenance manuals specified in Division 01.
  - 2. Record Documents: Showing locations of substrate moisture and alkalinity tests. Provide markups on floor plan indicating the location of each test and the dates tests were performed.

**1.3 QUALITY ASSURANCE**

- A. Installer Qualifications: Engage an experienced installer to perform work of this Section who has specialized in installing resilient products similar to those required for this Project and with a record of successful in-service performance.
- B. Source Limitations: Obtain each type, color, and pattern of product specified from one source with resources to provide products of consistent quality in appearance and physical properties without delaying the Work.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to Project site in manufacturer's original, unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store products in dry spaces protected from the weather, with ambient temperatures maintained between 55 and 85 degrees F.
- C. Store tiles on flat surfaces.

- D. Move products into spaces where they will be installed at least 48 hours before installation, unless longer conditioning period is recommended in writing by manufacturer.

#### 1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install resilient vinyl tile flooring until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install products until they are at the same temperature as the space where they are to be installed.
- C. Close spaces to traffic during flooring installation and for time period after installation recommended in writing by manufacturer.
- D. Install tiles and accessories after other finishing operations, including painting, have been completed.
- E. Where demountable partitions and other items are indicated for installation on top of resilient tile flooring, install tile before these items are installed.
- F. Do not install flooring over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive, as determined by flooring manufacturer's recommendations, and field moisture and alkalinity tests.

### **PART 2 PRODUCTS**

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient floor tile, as determined by testing identical products according to ASTM E648 or NFPA 253 by a qualified testing agency.
  - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

#### 2.2 POLYURETHANE / BIO-BASED RESILIENT FLOOR TILE

- A. Manufacturers:
  - 1. Kahrs.
  - 2. Matter Surfaces.
  - 3. Milliken & Company.
  - 4. Patcraft.
  - 5. Shaw Contract
- B. Description: Heterogeneous bio-polyurethane with glass fiber reinforcement, and paper print and PU top layer.
  - 1. Tile Standard: Products complying with ASTM F 3404.
  - 2. Wearing Surface: Smooth.
  - 3. Thickness: 3.2 mm.
  - 4. Size: as indicated.
  - 5. Basis of Design Product: Refer to Interior Finish Legend on Drawings.



## 2.3 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland-cement-based formulation provided or approved by flooring manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
  - 1. Verify adhesives have a VOC content of 50 g/L or less.
- C. Metal Edge Strips: Extruded aluminum with mill finish of width shown, of height required to protect exposed edge of tiles, and in maximum available lengths to minimize running joints. Refer to Interior Finish Legend on Drawings.
- D. Resilient base, floor finish transition strips, and accessories: Refer to Division 09 Section Resilient Base and Accessories.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 9 pH.
  - 4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor tiles until materials are the same temperature as space where they are to be installed.
  - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### 3.3 TILE INSTALLATION

- A. General: Comply with resilient tile manufacturer's written installation instructions.
- B. Lay out tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half of a tile at perimeter.
  - 1. Lay tiles square with room axis, unless otherwise indicated.
- C. Match tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Cut tiles neatly around all fixtures. Discard broken, cracked, chipped, or deformed tiles.
  - 1. Lay tiles in pattern of colors and sizes indicated on Drawings.
- D. Scribe, cut, and fit tiles to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, edgings, door frames, thresholds, and nosings.
- E. Extend tiles into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on sub-floor. Use chalk or other nonpermanent, non-staining marking device.
- G. Install tiles on covers for telephone and electrical ducts, and similar items in finished floor areas. Maintain overall continuity of color and pattern with pieces of flooring installed on covers. Tightly adhere edges to perimeter of floor around covers and to covers.
- H. Adhere tiles to flooring substrates using a full spread of adhesive applied to substrate to comply with tile manufacturer's written instructions, including those for trowel notching, adhesive mixing, and adhesive open and working times.
  - 1. Provide completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.
- I. Handroll tiles according to tile manufacturer's written instructions.

### 3.4 CLEANING AND PROTECTING

- A. Perform the following operations immediately after installing resilient products:
  - 1. Remove adhesive and other surface blemishes using cleaner recommended by resilient product manufacturers.
  - 2. Sweep or vacuum floor thoroughly.

3. Do not wash floor until after time period recommended by flooring manufacturer.
  4. Damp-mop floor to remove marks and soil.
- B. Protect flooring against mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by flooring manufacturer.
1. Cover products installed on floor surfaces with undyed, untreated building paper until inspection for Substantial Completion.
  2. Do not allow foot traffic or rolled traffic for time period after installation recommended in writing by flooring manufacturer, but not less than the following:
    - a. Foot traffic: Not less than 24 hours.
    - b. Rolled traffic: Not less than 72 hours.
  3. Do not move heavy and sharp objects directly over floor surfaces. Place plywood or hardboard panels over flooring and under objects while they are being moved. Slide or roll objects over panels without moving panels.
- C. Clean floor surfaces not more than 4 days before dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products according to manufacturer's written recommendations.

**END OF SECTION**

## **SECTION 09 66 23**

### **RESINOUS MATRIX TERRAZZO FLOORING**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Thin-set, epoxy-resin terrazzo flooring.
- B. Precast epoxy-resin terrazzo units.

##### **1.2 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data: For each type of product.
  - 2. Shop Drawings: Include terrazzo installation requirements. Include plans, sections, component details, and relationship to other work. Show layout of the following:
    - a. Divider strips.
  - 3. Control-joint strips.
    - a. Precast terrazzo jointing and edge configurations.
    - b. Terrazzo patterns.
  - 4. Samples: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo Sample to identify manufacturer's matrix color and aggregate types, sizes, and proportions. Prepare Samples of same thickness and from same material to be used for the Work, in sizes indicated below:
    - a. Terrazzo: 6-inch- (150-mm-) square Samples.
    - b. Precast Terrazzo: 6-inch- (150-mm-) square Samples.
- B. Informational Submittals:
  - 1. Qualification Data: For Installer.
  - 2. Material Certificates: For each type of terrazzo material or product.
  - 3. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.
  - 4. Test Reports: Pre-installation substrate moisture and alkalinity tests.
- C. Closeout Submittals:
  - 1. Maintenance Data: For terrazzo to include in maintenance manuals.
  - 2. Record Documents: Showing locations of substrate moisture and alkalinity tests. Provide markups on floor plan indicating the location of each test and the dates tests were performed.

##### **1.3 QUALITY ASSURANCE**

- A. Installer Qualifications:

1. Engage an installer who a contractor member of NTMA or is certified in writing by terrazzo manufacturer as qualified to install manufacturer's products.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number if any.
- B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

#### 1.5 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation.
- B. Field Measurements: Verify actual dimensions of construction contiguous with precast terrazzo by field measurements before fabrication.
- C. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.
- D. Close spaces to traffic during terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.
- E. Control and collect water and dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

## **PART 2 PRODUCTS**

#### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain primary terrazzo materials from single source from single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.
- B. Source Limitations for Aggregates: Obtain each color, grade, type, and variety of granular materials from single source with resources to provide materials of consistent quality in appearance and physical properties.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. NTMA Standards: Comply with NTMA's written recommendations for terrazzo type indicated unless more stringent requirements are specified.
- B. Verify flooring products comply with the requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

## 2.3 EPOXY-RESIN TERRAZZO

- A. Epoxy-Resin Terrazzo: Comply with manufacturer's written instructions for matrix and aggregate proportions and mixing.
  - 1. Manufacturers:
    - a. American Terrazzo.
    - b. Crossfield Products Corp., Dex-O-Tex Division.
    - c. General Polymers Corporation.
    - d. Hi-Tek Polymers, Inc.
    - e. Key Resin Company.
    - f. Terrazzo Marble and Supply.
  - 2. Thickness: 3/8-inch (9.5 mm) nominal.
  - 3. Formulated Mix Color and Pattern: Match existing.
- B. Materials:
  - 1. Flexible Reinforcing Membrane: Manufacturer's resinous membrane for substrate-crack preparation and reflective-crack reduction.
    - a. Reinforcement: Fiberglass scrim.
  - 2. Primer: Manufacturer's product recommended for substrate and use indicated.
  - 3. Epoxy-Resin Matrix: Manufacturer's standard recommended for use indicated and in color required for mix indicated.
    - a. Physical Properties without Aggregates:
      - 1) Hardness: 60 to 85 per ASTM D2240, Shore D.
    - b. Minimum Tensile Strength: 3000 psi (20.7 MPa) per ASTM D638 for a 2-inch (51-mm) specimen made using a "C" die per ASTM D412.
      - 1) Minimum Compressive Strength: 10,000 psi (6.9 MPa) per ASTM D695, Specimen B cylinder.
      - 2) Chemical Resistance: No deleterious effects by contaminants listed below after seven-day immersion at room temperature per ASTM D1308.
        - (a) Distilled water.
        - (b) Mineral water.
        - (c) Isopropanol.
        - (d) Ethanol.
        - (e) 0.025 percent detergent solution.
        - (f) 1.0 percent soap solution.
        - (g) 5 percent acetic acid.
        - (h) 10 percent sodium hydroxide.
    - 3) 10 percent hydrochloric acid.
      - (a) 30 percent sulfuric acid.
  - c. Physical Properties with Aggregates: For terrazzo blended according to manufacturer's recommendations with one part epoxy resin with three parts marble aggregate consisting of 60 percent No. 1 chips and 40 percent No. 0 chips that is ground and grouted to a 1/4-inch (6.35-mm) nominal thickness, and cured for 7 days at 75 deg F (24 deg C) plus or minus 2 deg F (1 deg C) and at 50 percent plus or minus 2 percent relative humidity.
    - 1) Flammability: Self-extinguishing, maximum extent of burning 1/4 inch (6.35 mm) according to ASTM D635.
    - 2) Thermal Coefficient of Linear Expansion: 0.0025 inch/inch per deg F (0.0025 mm/mm per 0.5556 deg C) according to ASTM C531.

4. Aggregates: Comply with NTMA gradation standards for mix indicated and contain no deleterious or foreign matter.
  - a. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C131/C131M.
  - b. 24-Hour Absorption Rate: Less than 0.75 percent.
  - c. Dust Content: Less than 1.0 percent by weight.
5. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than percent.
6. Finishing Grout: Resin based.

#### 2.4 PRECAST EPOXY-RESIN TERRAZZO

- A. Manufacturers:
  1. Precast Terrazzo Enterprises, Inc.
  2. Romoco Precast Terrazzo Products; a subsidiary of Roman Mosaic & Tile Company.
  3. Wausau Tile Inc.
- B. Precast Terrazzo Base (Where Scheduled): Minimum 3/8-inch- (10-mm-) thick, epoxy terrazzo units cast in maximum lengths possible, but not less than 36 inches (900 mm). Comply with manufacturer's written instructions for fabricating precast terrazzo base units in sizes and profiles indicated.
  1. Type: Match existing profile and height.
  2. Metal Toe Strip: Match existing.
  3. Outside Corner Units: With finished returned edges at outside corner.
  4. Color, Pattern, and Finish: Match adjacent poured-in-place terrazzo flooring.

#### 2.5 STRIP MATERIALS

- A. Thin-Set Divider Strips: L-type angle in depth required for topping thickness indicated.
  1. Material: As indicated.
  2. Top Width: As indicated.
- B. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material and color of divider strips and in depth required for topping thickness indicated.
- C. Accessory Strips: Match divider-strip width, material, and color unless otherwise indicated. Use the following types of accessory strips as required to provide a complete installation:
  1. Base-bead strips for exposed top edge of terrazzo base.

#### 2.6 MISCELLANEOUS ACCESSORIES

- A. Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use.
  1. Verify adhesives have a VOC content of 70 g/L or less.
- B. Anchoring Devices:
  1. Strips: Provide mechanical anchoring devices or adhesives for strip materials as recommended by manufacturer and as required for secure attachment to substrate.

2. Precast Terrazzo: Provide mechanical anchoring devices as recommended by fabricator for proper anchorage and support of units for conditions of installation and support.
- C. Patching and Fill Material: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.
- D. Joint Compound: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.
- E. Resinous Matrix Terrazzo Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by sealer manufacturer for use on terrazzo type indicated.
- F. Sealer: Slip- and stain-resistant, penetrating-type sealer that is chemically neutral; does not affect terrazzo color or physical properties; and is recommended by sealer manufacturer.
  1. Surface Friction: Not less than 0.6 according to ASTM D2047.
  2. Acid-Base Properties: With pH factor between 7 and 10.
- G. Floor Surface Protector: High performance floor surface protector.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates and areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions, including levelness tolerances, have been corrected.

#### **3.2 PREPARATION**

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of flooring.
- B. Concrete Substrates: Prepare according to ASTM F710.
  1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by resilient sheet flooring manufacturer. Do not use solvents.
  3. Alkalinity Testing: Perform pH testing according to ASTM F710. Proceed with installation only if pH readings are not less than 7.0 and not greater than 8.5.
  4. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft. (304.8 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.



- a. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
- 5. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
- 6. Repair damaged and deteriorated concrete according to terrazzo manufacturer's written instructions.
- 7. Use patching and fill material to fill holes and depressions in substrates according to terrazzo manufacturer's written instructions.
- C. Proceed with terrazzo installation only after concrete substrates pass moisture testing or after installation of moisture-vapor-emission-control membrane on substrate areas that fail testing.

### 3.3 EPOXY-RESIN TERRAZZO INSTALLATION

- A. Comply with NTMA's written recommendations for terrazzo and accessory installation.
- B. Place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to manufacturer's written instructions and NTMA (SPECS).
- C. Installation Tolerance: Limit variation in terrazzo surface from level to 1/4 inch in 10 feet (6.4 mm in 3 m); noncumulative.
- D. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.
- E. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.
- F. Flexible Reinforcing Membrane:
  - 1. Prepare and prefill substrate cracks with membrane material.
  - 2. Install membrane to produce full substrate coverage in areas to receive terrazzo.
  - 3. Reinforce membrane with fiberglass scrim.
  - 4. Prepare membrane according to manufacturer's written instructions before applying substrate primer.
- G. Primer: Apply to terrazzo substrates according to manufacturer's written instructions.
- H. Strip Materials:
  - 1. Divider and Control-Joint Strips:
    - a. Locate divider strips in locations indicated.
    - b. Install control-joint strips back to back and directly above concrete-slab control joints unless noted otherwise.
    - c. Install control-joint strips with 1/4-inch (6.4-mm) gap between strips, and install sealant in gap.
    - d. Install strips in adhesive setting bed without voids below strips, or mechanically anchor strips as required to attach strips to substrate, as recommended by strip manufacturer.
  - 2. Accessory Strips: Install as required to provide a complete installation.
- I. Place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to manufacturer's written instructions.

1. Installed Thickness: 3/8 inch (9.5 mm) nominal.
  2. Terrazzo Finishing: Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.
    - a. Rough Grinding: Grind with 24-grit or finer stones or with comparable diamond abrasives. Follow initial grind with 60/80-grit stones or with comparable diamond abrasives.
    - b. Grouting: Before grouting, clean terrazzo with water, rinse, and allow to dry. Apply and cure epoxy grout.
    - c. Fine Grinding/Polishing: Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted. Grind with 80-grit stones or with comparable diamond abrasives until grout is removed from surface.
  3. Installation Tolerance: Limit variation in terrazzo surface from level to 1/4 inch in 10 feet (6.4 mm in 3 m); noncumulative.
- J. Install and finish poured-in-place terrazzo stairs at the same time the adjacent terrazzo flooring is installed.
- K. Install and finish poured-in-place terrazzo base at the same time the adjacent terrazzo flooring is installed.

#### 3.4 PRECAST TERRAZZO INSTALLATION

- A. Install precast terrazzo units using method recommended in writing by NTMA and manufacturer unless otherwise indicated.
- B. Cutting, Fitting, and Installation: Perform cutting, drilling, and fitting required for installing precast terrazzo base. Set units accurately in location, alignment, and elevation, measured from established lines and levels.
- C. Installation Tolerance: Set units with alignment level and true to dimensions, varying 1/8 inch (3.2 mm) maximum in length, height, or width; noncumulative.
- D. Do not install units that are chipped, cracked, discolored, or improperly finished.
- E. Seal joints between units with joint compound matching precast terrazzo matrix.

#### 3.5 REPAIR

- A. Cut out and replace terrazzo areas that evidence lack of bond with substrate. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as approved by Architect.

#### 3.6 CLEANING AND PROTECTION

- A. Cleaning:
  1. Remove grinding dust from installation and adjacent areas.
  2. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow them to dry thoroughly.
- B. Sealing:

1. Seal surfaces according to NTMA's written recommendations.
  2. Apply sealer according to sealer manufacturer's written instructions.
- C. Floor Protector:
1. Apply floor protector according to sealer manufacturer's written instructions at Substantial Completion.
- D. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure that terrazzo is without damage or deterioration at time of Substantial Completion.

**END OF SECTION**

## **SECTION 09 68 13**

### **CARPET TILE**

#### **PART 1 GENERAL**

##### **1.1 SUMMARY**

- A. Carpet tile as shown on the Drawings and specified herein, including edge strips, subfloor preparation and related materials of the carpet tile installation.
- B. Related Sections:
  - 1. Cementitious Floor Underlayment: Section 03 54 16.
  - 2. Moisture Vapor Emission Control: Section 09 05 61.
  - 3. Resilient Wall Base: Section 09 65 13.

##### **1.2 PERFORMANCE REQUIREMENTS**

- A. Fire-Test-Response Characteristics: For resilient sheet flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
  - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

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

- A. Product Data: For each type of product.
  - 1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
- B. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.
  - 1. Carpet Tile: Full-size Sample.
  - 2. Edge Strips: 6 inch long pieces and samples of manufacturer's complete color range.

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

- A. Manufacturer`s Literature: Materials description and installation instructions for materials of the installation.
- B. Warranty: Signed copies of terms specified herein.
- C. Extra Material Receipt: Signed copies.

##### **1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

#### 1.6 EXTRA MATERIALS

- 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.
- B. Carpet Tile: Full-size units in boxes, equal to 5 percent of amount installed for each type or color indicated, but not less than 10 sq. yd.
- C. Submit a copy of the Owner's representative signed itemized receipt for extra material required.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with the Carpet and Rug Institute's CRI 104.
- B. Deliver installation materials to project site in original factory containers, labeled with identification of manufacturer and brand name
- C. Store materials in original undamaged packages and containers, inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity. Lay flat, blocked off ground. Maintain minimum temperature of 68 deg F at least three days prior to and during installation in area where materials are stored.

#### 1.8 PROJECT/SITE CONDITIONS

- A. Comply with the Carpet and Rug Institute's CRI 104 for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

#### 1.9 WARRANTY

- A. General Warranty: Special warranty specified in this Article is not to deprive Owner of other rights Owner may have under other provisions of the Contract Documents and is in addition to, and is to run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.

- B. **Product Warranty:** The carpet tile manufacturer is to provide a written warranty agreeing to replace defective carpet tiles in accordance with the General Conditions, except that warranty will be for 10 years, instead of 1 year. Provide written warranty signed by the Carpet Tile Manufacturer and the Installing Contractor and submit to the Architect.
1. Defects include, but are not limited to:
    - a. More than 10 percent edge raveling, snags, runs.
    - b. Dimensional stability.
    - c. Excess static discharge.
    - d. Loss of tuft bind strength.
    - e. Loss of face fiber.
    - f. Delamination.

## **PART 2 PRODUCTS**

### **2.1 MATERIALS**

- A. **Carpet Tile (CPT-1, CPT-2, CPT-3):** Carpet types, colors, patterns, products and manufacturers are indicated on the Floor Finish Schedule on the Drawings and Floor Finish Plans. Comparable products are subject to the Architect's approval and submission of substitution requests.
- B. **Installation Adhesive:** Water resistant and nonstaining, release adhesive as recommended by carpet tile manufacturer to comply with flammability requirements for installed carpet tile.
- C. **Latex leveling compound:** As recommended by the carpet tile manufacturer.
- D. **Edge Strips:** Solid vinyl of type shown on the Drawings, if not shown as selected by Architect from standard products and colors manufactured by one of the following:
1. Burke Flooring, a Division of Burke Industries, Umatilla, FL 32784
  2. Johnsonite Solon, OH 44139
  3. Flexco Co., Tuscumbia, AL 35674
  4. Shaw Contract (Design Basis)

## **PART 3 EXECUTION**

### **3.1 EXAMINATION**

- A. **Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects. Application or installation of materials constitutes acceptance of substrate.**
- B. **Concrete Subfloors:** Verify that concrete slabs comply with ASTM F 710 and the following:

1. Verify that floor lab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. If present remove in accordance with the carpet and adhesive manufacturer's requirements.
  2. Subfloor finishes comply with requirements specified in Section 03 30 00 - Cast-in-Place Concrete, for slabs receiving carpet tile.
  3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- D. Test for Moisture: Refer to Section 09 05 65 PREINSTALLATION TESTING FOR FLOOR FINISHES.

### 3.2 PREPARATION

- A. General: Comply with the Carpet and Rug Institute's CRI 104 and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.
- B. Level subfloors to be free of irregularities. Fill irregularities in the subfloor height affecting the carpet installation and appearance with troweled latex underlayment to create a ramp-like effect.
- C. Just prior to installation of carpeting and related materials, dry subfloors, broom clean, and remove oil, grease, paint or concrete treatment that may interfere with adhesion of carpet adhesive.
- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.3 INSTALLATION - GENERAL

- A. General: Comply with the Carpet and Rug Institute's CRI 104, Section 10, "Carpet Tile," and with carpet tile manufacturer's written installation instructions.
- B. Extend carpet tile under removable flanges and furnishings and into alcoves and closets of each space.
- C. Install carpet edge guard where edge of carpet tile is exposed; anchor guards to substrate.
- D. Install with pattern parallel to walls and borders. Install perimeter tiles as half-size or larger.
- E. Dry-fit sections of carpet tile prior to application of adhesive.
- F. Apply adhesive uniformly to substrate in accordance with manufacturer's instructions. Butt edges tight to form seams without gaps.
- G. Adhere perimeter tiles and partial tiles with a full spread of adhesive. Dry-fit cut tiles and apply adhesive to tile back after tile has been cut. In corridor areas, use full tiles down the center and cut perimeter tile borders.

3.4 CLEANING AND PROTECTION

- A. Remove adhesive from carpet tile surface with manufacturer's recommended cleaning agent.
- B. Vacuum using commercial machine with face-beater element. Remove soil. Replace carpet tiles where soil cannot be removed. Remove protruding face yarn.
- C. Protect installed carpet tile to comply with the Carpet and Rug Institute's CRI 104, Section 13.7.
- D. Remove rubbish, wrapping paper and salvages from the job site. Leave excess pieces of usable carpet tile with the Owner.

**END OF SECTION**



## **SECTION 09 91 00**

### **PAINTING**

#### **PART 1 GENERAL**

##### **1.1 SECTION INCLUDES**

- A. Surface preparation and the application of paint systems on interior substrates.

##### **1.2 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: 5 to 10 units at 60 degrees and 10 to 25 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.

##### **1.3 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data: For each type of Paint System, submit product data cut sheets, including preparation requirements and application instructions.
    - a. Formulate product data cut sheets into sets for each Paint System required.
  - 2. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
    - a. Step coats on Samples to show each coat required for system.
    - b. Label each Sample with Paint System designation.
    - c. Label each Sample for location and application area.
    - d. Dry samples a minimum of 7-days before submitting.
    - e. Submit Samples on the following substrates for the Architect's review of color and texture only:
      - 1) Gypsum Board / Plaster: Provide two 8-inches (200-mm) square samples on rigid backing.
  - 3. Product List: For each product indicated, include the following:
    - a. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
    - b. VOC content.

#### 1.4 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.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

#### 1.6 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.

### **PART 2 PRODUCTS**

#### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products in the paint schedules.
- B. Manufacturers: The following manufacturers are referred to in the paint schedules by use of name or shortened versions of their names, which are shown in parentheses:
  - 1. Benjamin Moore (B-M).
  - 2. PPG Paints (PPG)
  - 3. Sherwin-Williams (S-W)

#### 2.2 PAINT, GENERAL

- A. 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.
- B. VOC Content: For field applications that are inside the weatherproofing system, verify paints and coatings comply with VOC content limits of authorities having jurisdiction and the following VOC content limits:
1. Flat Paints and Coatings: 50 g/L.
  2. Nonflat Paints and Coatings: 50 g/L.
  3. Dry-Fog Coatings: 150 g/L.
  4. Primers, Sealers, and Undercoaters: 100 g/L.
  5. Rust-Preventive Coatings: 100 g/L.
  6. Zinc-Rich Industrial Maintenance Primers: 100 g/L.
  7. Pretreatment Wash Primers: 420 g/L.
- C. Colors: Provide custom colors of the finished paint systems to match the Architect's samples.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  1. Gypsum Board: 12 percent.
- C. Gypsum Board Substrates: Verify that the finishing compound is sanded smooth.
- D. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- E. 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" or "MPI Maintenance Repainting Manual" or more stringent instructions listed below 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 the 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. Steel (Ferrous Metal) Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
  1. SSPC-SP 3, "Power Tool Cleaning."
- F. 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.

### 3.3 SURFACE PREPARATION OF PREVIOUSLY COATED SURFACES

- A. General:
  1. Remove cracked and deteriorated sealants and caulking.
  2. Remove chalk deposits and loose, blistered, peeling, scaling, or crazed finish to bare base material or sound substrate by scraping and sanding.
  3. Wash surfaces with solution of Trisodium phosphate (TSP) to remove wax, oil, grease, and other foreign material; rinse, and allow to dry. Exercise caution that TSP solution does not soften existing coating.
  4. Abrade glossy surfaces by sanding or wiping with liquid de-glosser.
  5. Remove mildew as specified above.
  6. Test compatibility of existing coatings by applying new coating to small, inconspicuous area. If new coatings lift or blister existing coatings, provide test results and recommendations from paint manufacturer to Architect.
  7. Apply specified primer to surfaces scheduled to receive coatings.
- B. Gypsum Board:
  1. Fill cracks and voids with spackling compound.
  2. Apply primer over bare surfaces and newly applied texture coatings.
- C. Metal:
  1. Remove rust from surfaces to bare metal in accordance with SP3 "Power Tool Cleaning."
  2. Exercise care not to remove galvanizing.
  3. Complete preparation as specified for new work.
- D. Wood:

1. Fill cracks, crevices and nail holes with putty or wood filler.
2. Apply primer over bare surfaces and filler material.

### 3.4 APPLICATION

- A. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.
  1. Painting includes identifying fire-rated wall assemblies with stenciled lettering above the ceiling. Provide stenciled block letters in red to identify each rated wall assembly. Refer to Section 09 29 00 - Gypsum Board.
  2. Stairs: Paint exposed surfaces including underside.
- B. Paint Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
  1. Paint the following work where exposed in occupied spaces:
    - a. Equipment, including panelboards.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.
    - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    - h. Unfinished and primed louvers and grilles, covers,
    - i. Exposed and insulated pipes.
    - j. Factory primed equipment.
  2. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
  1. Prefinished items include the following factory-finished components:
    - a. Architectural woodwork and casework.
    - b. Metal lockers.
    - c. Elevator entrance doors and frames.
    - d. Elevator equipment.
    - e. Finished mechanical and electrical equipment.
    - f. Light fixtures.
    - g. Panelboards and switch gear
  2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
    - a. Furred areas.
    - b. Ceiling plenums.
    - c. Utility tunnels.
    - d. Pipe spaces.
    - e. Duct shafts.
    - f. Elevator shafts.

3. Finished metal surfaces include the following:
  - a. Anodized aluminum.
  - b. Stainless steel.
  - c. Chromium plate.
  - d. Copper.
  - e. Bronze and brass.
- D. 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, equipment, furniture, etc. the same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items, equipment, furniture, etc with prime coat only.
  3. Paint both sides and edges of doors and entire exposed surface of door frames.
  4. Paint the front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  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.
  7. Spray Equipment: Use airless spray equipment with orifice size as recommended by the manufacturer for the material required. Confirm use of spray equipment is acceptable to building owner in occupied areas.
- E. Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling, such as laps, irregularity in texture, skid marks, or other surface imperfections.
- F. 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.
- G. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- H. 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.
- I. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.
- J. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.

### 3.5 FIELD QUALITY CONTROL

- A. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not complying with requirements.
- B. 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.

### 3.6 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.

### 3.7 INTERIOR PAINT SCHEDULES

- A. Concrete (Co) Substrates, Nontraffic Surfaces:
  - 1. Paint System Co-L5: Latex, Semigloss Finish:
    - a. B-M:
      - 1) First Coat: Ultra Spec Masonry Int/Ext Acrylic Sealer 608
      - 2) Second Coat: Ultra Spec 500 Zero Voc WB Semi-Gloss T546
      - 3) Third Coat: Same as second
    - b. PPG:
      - 1) First Coat: Perma Crete Alkali Resistant Primer 4-603XI
      - 2) Second Coat: Speedhide ZERO Interior Semi-Gloss 6-5510.
      - 3) Third Coat: Same as second.
    - c. S-W:
      - 1) First Coat: Loxon Concrete & Masonry Primer, LX02W0050.
      - 2) Second Coat: ProMar 200 Zero VOC Semi-Gloss Acrylic, B31-2600 Series.
      - 3) Third Coat: Same as second.
- B. Steel, Unprimed (Su) Substrates
  - 1. Paint System Su-L5: Latex, Semigloss Finish:
    - a. B-M:
      - 1) First Coat: Corotech Acrylic Metal Primer V110
      - 2) Second Coat: Corotech Acrylic DTM Enamel Semi-Gloss V331
      - 3) Third Coat: Same as second.

- b. PPG:
    - 1) First Coat: Pitt-Tech Plus 4020 PF Interior/Exterior Primer/Finish, 4020PF Series.
    - 2) Second Coat: PPG Pitt-Tech Plus EP Semi-Gloss DTM 90-1610 Series.
    - 3) Third Coat: Same as second.
  - c. S-W:
    - 1) First Coat: Pro Industrial Pro-Cryl Universal Primer, B66-1300 Series.
    - 2) Second Coat: Pro Industrial Acrylic Semi-Gloss, B66-650.
    - 3) Third Coat: Same as second.
- C. Steel, Factory-Primed (Sp) Substrates
- 1. Paint System Sp-L5: Latex, Semigloss Finish:
    - a. B-M:
      - 1) First Coat: Touch-up primer if compatible or provide barrier coat.
      - 2) Second Coat: Corotech Acrylic DTM Enamel Semi-Gloss V331.
      - 3) Third Coat: Same as second.
    - b. PPG:
      - 1) First Coat: Touch-up primer if compatible or provide barrier coat.
      - 2) Second Coat: PPG Pitt-Tech Plus EP Semi-Gloss DTM 90-1610
      - 3) Third Coat: Same as second.
    - c. S-W:
      - 1) First Coat: Touch-up primer if compatible or provide barrier coat.
      - 2) Second Coat: Pro Industrial Acrylic Semi-Gloss, B66-650.
      - 3) Third Coat: Same as second.
- D. Steel, Galvanized (Sg) Substrates
- 1. Paint System Sg-L5: Latex, Semigloss Finish:
    - a. B-M:
      - 1) First Coat: Ultra Spec HP Acrylic Metal Primer HP04
      - 2) Second Coat: Ultra Spec HP DTM Acrylic Semi-Gloss HP29
      - 3) Third Coat: Same as second
    - b. PPG:
      - 1) First Coat: Pitt Tech Plus Acrylic Primer 90-912
      - 2) Second Coat: PPG Pitt-Tech Plus EP Semi-Gloss DTM 90-1610
      - 3) Third Coat: Same as second.
    - c. S-W:
      - 1) First Coat: Pro Industrial Pro-Cryl Universal Primer, B66-1300 Series.
      - 2) Second Coat: Pro Industrial Acrylic Semi-Gloss, B66-650.
      - 3) Third Coat: Same as second.
- E. Gypsum Board (Gb) Substrates
- 1. Paint System Gb-L2: Latex, Eggshell Finish:
    - a. B-M:
      - 1) First Coat: Ultra Spec 500 Zero VOC Interior Zero VOC Latex Primer N534
      - 2) Second Coat: Ultra Spec 500 Zero VOC Latex Eggshell N538
      - 3) Third Coat: Same as second.
    - b. PPG:
      - 1) First Coat: Speedhide Zero Interior Sealer, 6-4900XI.
      - 2) Second Coat: Speedhide Zero Interior Eggshell, 6-5310 Series.
      - 3) Third Coat: Same as second.



- c. S-W:
    - 1) First Coat: ProMar 200 Zero VOC Interior Latex Primer, B28W2600.
    - 2) Second Coat: ProMar 200 Zero VOC Interior Latex Eg-Shel, B20-2600 Series.
    - 3) Third Coat: Same as second.
- 2. Paint System Gb-L1: Latex, Flat Finish:
  - a. B-M:
    - 1) First Coat: Ultra Spec 500 Zero VOC Interior Zero VOC Latex Primer N534.
    - 2) Second Coat: Ultra Spec 500 Zero VOC Interior Latex Flat N536.
    - 3) Third Coat: Same as second.
  - b. PPG:
    - 1) First Coat: Speedhide Zero Interior Sealer, 6-4900XI.
    - 2) Second Coat: Speedhide Zero Interior Flat, 6-5110 Series.
    - 3) Third Coat: Same as second.
  - c. S-W:
    - 1) First Coat: ProMar 200 Zero VOC Interior Latex Primer, B28W2600.
    - 2) Second Coat: ProMar 200 Zero VOC Interior Latex Flat, B30-2600 Series.
    - 3) Third Coat: Same as second.
- 3. Paint System Gb-X5: Waterborne Epoxy System, Semigloss Finish:
  - a. B-M:
    - 1) First Coat: Ultra Spec 500 Interior Zero VOC Latex Primer N534
    - 2) Second Coat: Corotech Pre-Catalyzed Waterborne Epoxy Semi-Gloss V341
    - 3) Third Coat: Same as second.
  - b. PPG:
    - 1) First Coat: Speedhide Zero Interior Sealer, 6-4900XI.
    - 2) Second Coat: Pitt-Glaze WB1 Pre-Catalyzed Acrylic Epoxy 16-510 Series.
    - 3) Third Coat: Same as second.
  - c. S-W:
    - 1) First Coat: ProMar 200 Zero VOC Interior Latex Primer,  
(a) B28W2600.
    - 2) Second Coat: Pre-Catalyzed Water Based Epoxy Semi-Gloss, K46-1150 Series.
    - 3) Third Coat: Same as second.
- F. Gypsum Board, Moisture-Resistant (Gm) Substrates:
  - 1. Paint System Gm-L2: Latex, Eggshell Finish:
    - a. B-M:
      - 1) First Coat: Ultra Spec 500 Interior Zero VOC Latex Primer N534
      - 2) Second Coat: Corotech Pre-Catalyzed Waterborne Epoxy V342
      - 3) Third Coat: Same as second
    - b. PPG:
      - 1) First Coat: Speedhide Zero Interior Sealer, 6-4900XI.
      - 2) Second Coat: Pitt-Glaze WB1 Pre-Catalyzed Acrylic Epoxy 16-310 Series.
      - 3) Third Coat: Same as second.
    - c. S-W:

- 1) First Coat: ProMar 200 Zero VOC Interior Latex Primer, B28W2600.
  - 2) Second Coat: Pro Industrial Pre-Catalyzed Waterbased Epoxy  
(a) Eg-Shel, K45-1150 Series.
  - 3) Third Coat: Same as second.
2. Paint System Gm-X5: Waterborne Epoxy, Semigloss Finish:
- a. B-M:
    - 1) First Coat: Ultra Spec 500 Interior Zero VOC Latex Primer N534
    - 2) Second Coat: Corotech Pre-Catalyzed Waterborne Epoxy V341
    - 3) Third Coat: Same as second
  - b. PPG:
    - 1) First Coat: Speedhide Zero Interior Sealer, 6-4900XI.
    - 2) Second Coat: Pitt-Glaze WB1 Pre-Catalyzed Acrylic Epoxy 16-510 Series.
    - 3) Third Coat: Same as second.
  - c. S-W:
    - 1) First Coat: ProMar 200 Zero VOC Interior Latex Primer, B28W2600.
    - 2) Second Coat: Pre-Catalyzed Water Based Epoxy Semi-Gloss, K46-1150 Series.
    - 3) Third Coat: Same as second.

**END OF SECTION**

**SECTION 10 11 00**  
**VISUAL DISPLAY UNITS**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Porcelain-enamel markerboard panels.
- B. Tackboard panels.

**1.2 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data: For each type of product.
    - a. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for visual display units.
  - 2. Shop Drawings: For visual display units.
    - a. Include plans, elevations, sections, details, and attachment to other work.
    - b. Show locations of panel joints. Show locations of field-assembled joints for factory-fabricated units too large to ship in one piece.]
    - c. Show locations and layout of special-purpose graphics.
    - d. Include sections of typical trim members.
  - 3. Samples: For each type of visual display unit indicated.
    - a. Visual Display Panel: Not less than 8-1/2 by 11 inches (215 by 280 mm), with facing, core, and backing indicated for final Work. Include one panel for each type, color, and texture required.
- B. Informational Submittals:
  - 1. Qualification Data: For Installer.
  - 2. Product Test Reports: For each visual display unit, for tests performed by manufacturer and witnessed by a qualified testing agency.
  - 3. Sample Warranties: For manufacturer's special warranties.
- C. Closeout Submittals:
  - 1. Maintenance Data: For visual display units to include in maintenance manuals.

**1.3 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver factory-fabricated visual display units completely assembled in one piece. If dimensions exceed maximum manufactured unit size, or if unit size is impracticable to ship in one piece, provide two or more pieces with joints in locations indicated on approved Shop Drawings.

#### 1.4 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install visual display units until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

#### 1.5 WARRANTY

- A. Special Warranty for Porcelain-Enamel Face Sheets: Manufacturer agrees to repair or replace porcelain-enamel face sheets that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Surfaces lose original writing and erasing qualities.
    - b. Surfaces exhibit crazing, cracking, or flaking.

### **PART 2 PRODUCTS**

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 25 or less.
  - 2. Smoke-Developed Index: 450 or less.

#### 2.2 PORCELAIN-ENAMEL MARKERBOARD PANELS

- A. Manufacturers:
  - 1. A-1 Visual Systems.
  - 2. AJW Architectural Products.
  - 3. Claridge Products and Equipment, Inc.
  - 4. Ghent Manufacturing, Inc.
  - 5. Marsh Industries, Inc.
  - 6. Peter Pepper Products, Inc.
  - 7. PolyVision Corporation.
- B. Porcelain-Enamel Markerboard Panels: Balanced, high-pressure, factory-laminated markerboard assembly of three-ply construction, consisting of moisture-barrier backing, core material, and porcelain-enamel face sheet with low-gloss finish. Laminate panels under heat and pressure with manufacturer's standard, flexible waterproof adhesive.
  - 1. Face Sheet Thickness: 0.013 inch (0.33 mm) minimum uncoated base metal thickness.
  - 2. Manufacturer's Standard Core: Minimum 1/4 inch (6 mm) thick, with manufacturer's standard moisture-barrier backing.
  - 3. Laminating Adhesive: Manufacturer's standard moisture-resistant thermoplastic type.
  - 4. Color: White.
  - 5. Field or factory fabricated.

6. Corners: Square.
  7. Width: As indicated on Drawings.
  8. Height: As indicated on Drawings.
  9. Mounting Method: Direct to wall.
- C. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- (1.57-mm-) thick, extruded aluminum; standard size and shape.
1. Aluminum Finish: Clear anodic finish.
- D. Joints: Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.
- E. Marker Tray: Manufacturer's standard; continuous.
1. Solid Type: Extruded aluminum with ribbed section and smoothly curved exposed ends.

## 2.3 TACKBOARD PANELS

- A. Manufacturers:
1. A-1 Visual Systems.
  2. AJW Architectural Products.
  3. Claridge Products and Equipment, Inc.
  4. Ghent Manufacturing, Inc.
  5. Marsh Industries, Inc.
  6. Peter Pepper Products, Inc.
  7. PolyVision Corporation.
- B. Tackboard Panel: Natural-cork tackboard panel on manufacturer's standard core.
1. Fabric Wrapped Edge: Wrap edge of tackboard panel with fabric facing.
  2. Color and Pattern: As indicated by manufacturer's designations.
  3. Facing: 1/4-inch- (6-mm-) thick, natural cork.
  4. Facing: Vinyl fabric factory laminated to 1/4-inch- (6-mm-) thick, cork sheet.
  5. Field or factory fabricated.
  6. Corners: Square.
  7. Width: As indicated on Drawings.
  8. Height: As indicated on Drawings.
  9. Mounting Method: Direct to wall.
- C. Aluminum Frames and Trim: Fabricated from not less than 0.062-inch- (1.57-mm-) thick, extruded aluminum; standard size and shape.
1. Aluminum Finish: Clear anodic finish.
- D. Joints: Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, as indicated on approved Shop Drawings.

## 2.4 MATERIALS

- A. Porcelain-Enamel Face Sheet: PEI-1002, with face sheet manufacturer's standard two- or three-coat process.
- B. Natural-Cork Sheet: Seamless, single-layer, compressed fine-grain cork sheet; bulletin board quality; face sanded for natural finish; with surface-burning characteristics indicated.

- C. Extruded Aluminum: ASTM B221 (ASTM B221M), Alloy 6063.
- D. Adhesives for Field Application: Mildew-resistant, nonstaining adhesive for use with specific type of panels, sheets, or assemblies; and for substrate application; as recommended in writing by visual display unit manufacturer.
  - 1. Adhesives shall have a VOC content of 50 g/L or less.
- E. Primer/Sealer: Mildew-resistant primer/sealer complying with requirements in Section 09 91 23 - Interior Painting and recommended in writing by visual display unit manufacturer for intended substrate.

## 2.5 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM AMP 500-06 for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.6 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

# PART 3 EXECUTION

## 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for installation tolerances, surface conditions of wall, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

## 3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances, such as dirt, mold, and mildew, that could impair the performance of and affect the smooth, finished surfaces of visual display boards.
- C. Prepare surfaces to achieve a smooth, dry, clean surface free of flaking, unsound coatings, cracks, defects, projections, depressions, and substances that will impair bond between visual display units and wall surfaces.
- D. Prime wall surfaces indicated to receive visual display units and as recommended in writing by primer/sealer manufacturer and visual display unit manufacturer.
- E. Prepare recesses for sliding visual display units as required by type and size of unit.

### 3.3 INSTALLATION

- A. General: Install visual display units in locations and at mounting heights indicated on Drawings, or if not indicated, at heights indicated below. Keep perimeter lines straight, level, and plumb. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for complete installation.
- B. Visual Display Board Units: Attach concealed clips, hangers, and grounds to wall surfaces and to visual display board assemblies with fasteners at not more than 16 inches (400 mm) o.c. Secure tops and bottoms of boards to walls.
  - 1. Make joints only where total length exceeds maximum manufactured length. Fabricate with minimum number of joints, balanced around center of board, as acceptable to Architect.
  - 2. Where size of visual display board units or other conditions require support in addition to normal trim, provide structural supports or modify trim as indicated or as selected by Architect from manufacturer's standard structural support accessories to suit conditions indicated.
- C. Visual Display Board Unit Mounting Heights: Install visual display units at mounting heights indicated on Drawings.

### 3.4 CLEANING AND PROTECTION

- A. Clean visual display units in accordance with manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.
- B. Touch up finishes to restore damaged or soiled areas.
- C. Cover and protect visual display units after installation and cleaning.

### **END OF SECTION**

**SECTION 10 26 10**  
**WALL AND CORNER GUARDS**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Stainless steel corner guards, including mounting and installation accessories.
- B. Related Sections:
  - 1. Rough carpentry: Section 06 10 00.
  - 2. Non-load bearing metal framing: Section 09 22 16.
  - 3. Gypsum board: Section 09 29 00.

**1.2 PERFORMANCE REQUIREMENTS**

- A. Regulatory Requirements: Comply with applicable provisions in the USDOJ's "2010 ADA Standards for Accessible Design", Illinois Accessibility Code, and ICC A117.1.

**1.3 ACTION SUBMITTALS**

- A. Shop Drawings: Plan layout of wall guards, details of each type of installation for wall and corner guards showing underlying and adjacent construction anchors, fasteners, their material and spacing.
- B. Samples for Verification: For each type of exposed finish on the following products, prepared on Samples 6 inches square or 12 inches long as appropriate.

**1.4 INFORMATIONAL SUBMITTALS**

- A. Manufacturers Literature: Materials description and installation instructions.
- B. Certification: Certified copies of U.L. test classification and fire rated wall test.

**1.5 CLOSEOUT SUBMITTALS**

- A. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.
  - 1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.
- B. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Furnish an amount equal to 2 percent of each type, color, and texture of cover installed, but no fewer than 2 units.



1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain wall and corner guards from one manufacturer.
- B. Provide wall and corner guards that have been tested and classified for a U.L. Class I rating.

1.7 DELIVERY, STORAGE AND HANDLING

- A. Deliver wall and corner guards in manufacturer's original unopened and undamaged packing. Clearly identify manufacturer, contents, stock number and order number on each package. Packages showing indications of damage that affect condition of contents are not acceptable. Do not deliver to project site until area of installation is ready for installation.
- B. Store in original packing under protective cover and protect from damage. Store containers in accordance with manufacturer's recommendations. Handle materials in such manner as to prevent damage to products or finishes.

**PART 2 PRODUCTS**

2.1 ACCEPTABLE MANUFACTURERS

- A. Nystrom, Inc., Minneapolis, MN 55428.
- B. Construction Specialties, Inc., Muncy, PA 17756.
- C. Korogard Wall Protection Systems; a division of RJF International Corporation, Fairlawn, OH 44333.
- D. Inpro Corporation, Muskego, WI 53150.

2.2 ITEMS

- A. General: Provide listed Basis of Design Products or comparable products, manufactured by an Acceptable Manufacturer, as approved by Architect.
- B. Surface Mounted Corner Guards: 90 degree, 14 GA, 304 stainless steel with No 4 satin finish surface mounted guards with 3 1/2 inch wide legs, bullnose corner. 48" length mounted with counter sunk stainless steel hardware aligned to the top of base, one of the following:
  - 1. "Model ACO-8, Acrovyn" (Construction Specialties).
  - 2. "3GSS35SD-CSH" (Nystrom).
  - 3. "GS10" (Korogard).
  - 4. "Stainless Steel" (Inpro).

### **PART 3 EXECUTION**

#### **3.1 INSPECTION**

- A. Examine surfaces and construction to receive parts of the work specified herein. Verify dimensions of in place and subsequent construction. Installation of wall and corner guards constitutes acceptance of the related construction and conditions.

#### **3.2 INSTALLATION**

- A. Coordinate the installation of wall and corner guards with the installation of required support and attachment framing to be located in walls.
- B. Install wall and corner guards in accordance with the manufacturer's printed instructions and the final reviewed shop drawings. Install guards straight and true to established lines.

#### **3.3 CLEANING AND PROTECTION**

- A. Remove and replace defective work or work that cannot be successfully repaired.
- B. Just prior to final acceptance, remove protective coverings and clean surfaces as recommended by the manufacturer.
- C. Use procedures and precautions for protection of installed wall and corner guards until final completion of the Work.

### **END OF SECTION**

**SECTION 10 44 00**  
**FIRE PROTECTION SPECIALTIES**

**PART 1 GENERAL**

**1.1 SECTION INCLUDES**

- A. Fire-Protection Cabinets.
- B. Fire Extinguishers.
- C. Mounting Brackets.

**1.2 PREINSTALLATION CONFERENCE**

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to fire-protection cabinets including, but not limited to, the following:
    - a. Schedules and coordination requirements.

**1.3 SUBMITTALS**

- A. Action Submittals:
  - 1. Product Data: For each type of product. Show door hardware, cabinet type, trim style, and panel style. Include roughing-in dimensions and details showing recessed-, semirecessed-, or surface-mounting method and relationships of box and trim to surrounding construction.
  - 2. Shop Drawings: For fire-protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
  - 3. Product Schedule: For fire-protection cabinets. Indicate whether recessed, semirecessed, or surface mounted. Coordinate final fire-protection cabinet schedule with fire-extinguisher schedule to ensure proper fit and function. Use same designations indicated on Drawings.
- B. Closeout Submittals:
  - 1. Maintenance Data: For fire-protection cabinets to include in maintenance manuals.

**1.4 COORDINATION**

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

## **PART 2 PRODUCTS**

### **2.1 PERFORMANCE REQUIREMENTS**

- A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Standard for Portable Fire Extinguishers."
- B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.
  - 1. Provide fire extinguishers approved, listed, and labeled by FM (AG).
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

### **2.2 FIRE-PROTECTION CABINETS**

- A. Cabinet Type: Suitable for fire extinguisher.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Activar Construction Products Group, Inc. - JL Industries; Ambassador Series.
    - b. Kidde, a unit of United Technologies Corp. .
    - c. Guardian Fire Equipment, Inc. .
    - d. Larsens Manufacturing Company .
    - e. Potter-Roemer LLC. .
- B. Cabinet Construction: Cabinet shall match fire rating of wall construction that cabinet is installed within.
- C. Cabinet Material: Cold-rolled steel sheet.
  - 1. Shelf: Same metal and finish as cabinet.
- D. Recessed Cabinet:
  - 1. Exposed Flat Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
- E. Semirecessed Cabinet: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
  - 1. Rolled-Edge Trim: 2-1/2-inch (64-mm) backbend depth.
- F. Door Material: Steel sheet.
- G. Door Style: Vertical duo panel with frame.
- H. Door Glazing: Clear float glass.
- 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 continuous hinge, of same material and finish as trim, permitting door to open 180 degrees.

J. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire-protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Break-Glass Strike: Manufacturer's standard metal strike, complete with chain and mounting clip, secured to cabinet.
3. Lettered Door Handle: One-piece, cast-iron door handle with the word "FIRE" embossed into face.
4. Door Lock: Cylinder lock, keyed alike to other cabinets.
5. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated.
  - a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER ."
    - 1) Location: Applied to cabinet door.
    - 2) Application Process: Pressure-sensitive vinyl letters.
    - 3) Lettering Color: Black.
    - 4) Orientation: Vertical.
6. Alarm: Manufacturer's standard alarm that actuates when fire-protection cabinet door is opened and that is powered by batteries.

K. Materials:

1. Cold-Rolled Steel: ASTM A1008/A1008M, Commercial Steel (CS), Type B.
  - a. Finish: Baked enamel or powder coat.
  - b. Color: As selected by Architect from full range of industry colors and color densities.
2. Clear Float Glass: ASTM C1036, Type I, Class 1, Quality q3, 3 mm thick.
3. Tempered Float Glass: ASTM C1048, Kind FT, Condition A, Type I, Quality q3, 3 mm thick, Class 1 (clear).

## 2.3 FIRE EXTINGUISHERS

- A. Fire extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
1. Provide extinguishers labeled by UL (DIR) or FM (AG) for purpose specified and as indicated.
- B. 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. Guardian Fire Equipment, Inc.
    - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
    - c. Kidde Residential and Commercial Division; Subsidiary of Kidde plc.
    - d. Larsens Manufacturing Company.
    - e. Potter Roemer LLC.
  2. Valves: Manufacturer's standard.
  3. Handles and Levers: Manufacturer's standard.
  4. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.

- C. Multipurpose Dry-Chemical Type in Steel Container : UL-rated 4-A:60-B:C, 10-lb (4.5-kg) nominal capacity, with monoammonium phosphate-based dry chemical in enameled-steel container.

## 2.4 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or black baked-enamel finish.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Guardian Fire Equipment, Inc.
    - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
    - c. Larsens Manufacturing Company.
    - d. Potter Roemer LLC.
- 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.

## 2.5 FABRICATION

- A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
  - 1. Weld joints and grind smooth.
  - 2. Provide factory-drilled mounting holes.
  - 3. Prepare doors and frames to receive locks.
  - 4. Install door locks at factory.
- B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles.
  - 1. Miter and weld perimeter door frames.
- C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

## 2.6 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM AMP 500-06, "Metal Finishes Manual for Architectural and Metal Products," for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces of fire-protection cabinets from damage by applying a strippable, temporary protective covering before shipping.
- C. Finish fire-protection cabinets after assembly.
- D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

### **PART 3 EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine walls and partitions for suitable framing depth and blocking where recessed and semirecessed cabinets will be installed.
- B. Examine fire extinguishers for proper charging and tagging.
  - 1. Remove and replace damaged, defective, or undercharged fire extinguishers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### **3.2 PREPARATION**

- A. Prepare recesses for recessed and semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

#### **3.3 INSTALLATION-FIRE PROTECTION 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.
- B. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.
  - 1. Unless otherwise indicated, provide recessed fire-protection cabinets. If wall thickness is inadequate for recessed cabinets, provide semirecessed fire-protection cabinets.
  - 2. Provide inside latch and lock for break-glass panels.
  - 3. Fasten mounting brackets to inside surface of fire-protection cabinets, square and plumb.
- C. Identification: Apply vinyl lettering at locations indicated.

#### **3.4 INSTALLATION-FIRE EXTINGUISHERS**

- A. General: Install fire extinguishers and mounting brackets in locations indicated and in compliance with requirements of authorities having jurisdiction.
  - 1. Mounting Brackets: 54 inches (1372 mm) above finished floor to top of fire extinguisher.
- B. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

#### **3.5 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.

### 3.6 SCHEDULE

- A. Provide one wall hung fire extinguisher in each electrical room and each storage room over 100 square feet.
- B. Provide in corridors at locations indicated and if not, spacing as required by AHJ, but not less than 1 / 3000 SF and not more than 75' of travel in corridors.

### **END OF SECTION**



**SECTION 12 24 13**  
**ROLLER WINDOW SHADES**

**PART 1 GENERAL**

**1.1 SUMMARY**

- A. Manually operated roller window shades.
- B. Related Sections:
  - 1. Rough carpentry: Section 06 10 00.
  - 2. Non-structural metal framing: Section 09 22 16.
  - 3. Gypsum board: Section 09 29 00.
  - 4. Acoustical ceilings: Section 09 51 00.

**1.2 ACTION SUBMITTALS**

- A. Product data sheets for window shades.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.
  - 1. Show and describe anchors and fasteners on the shop drawings.
- C. Samples for Initial Selection: For each colored component of each type of shade indicated.
  - 1. Include similar samples of accessories involving color selection.
  - 2. Window manufacturer's standard color samples for exposed metal components showing the complete range of available standard colors.
- D. Samples for Verification:
  - 1. Shade Material: Not less than 12 inch square section of fabric, from dye lot used for the Work, with specified treatments applied. Show complete pattern repeat. Mark top and face of material.

**1.3 INFORMATIONAL SUBMITTALS**

- A. Manufacturer's Literature: including materials and fabrication descriptions and installation and operation instructions/specifications for window shades.
- B. Window Treatment Schedule: For roller shades. Use same designations indicated on Drawings.
- C. Warranty: Copies of the warranty in the form and content (terms) indicated herein.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: Methods for maintaining roller shades, precautions regarding cleaning materials and methods, instructions for operating hardware and controls.

1.5 QUALITY ASSURANCE

- A. Comply with laws, ordinances, rules, regulations and orders of public authorities having jurisdiction over this part of the work.
- B. Fire-Performance Characteristics: Provide shade material tested in accordance with NFPA 701 - Vertical-Burn Test and rated "PASS".
- C. Source Limitations: Obtain roller window shades through one source from a single manufacturer
- D. Installing Contractor: Roller Window Shade Manufacturer authorized (Certified) installation and service firm with a minimum of 5 consecutive years roller window shade installation experience. Provide written evidence of installation experience to Architect upon request.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver roller window shades in original unopened containers and packaging with manufacturer's name, brand name, U.L classification, installation instructions, and using same designations indicated on Drawings.

1.7 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller window shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller window shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

1.8 WARRANTY

- A. The roller window shades manufacturer is to provide a written warranty stating that the roller window shades installation and associated controls will be free of faults and defects in accordance with the General Conditions, except that the warranty is to be extended by the Roller Window Shade Manufacturer for the following:
  - 1. Shadecloth: Provide warranty period of 10 years from Date of Substantial Completion that the shadecloth will not deteriorate, sag, or warp and will not be unfit for the use intended for the warranty period.
- B. Provide warranty signed by the Installing Contractor and the Window Shade Manufacturer and submit to the Architect.

- C. This warranty is in addition to, and not a limitation of, other rights the Owner may have against the Contractor under the Contract Documents.

## **PART 2 PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Source Limitations: Obtain roller shades from single source from single manufacturer.
- B. Acceptable Manufacturers:
1. MechoSystems, Inc, Long Island City, NY 11101
  2. Lutron Shading Solutions by Vimco, Ashland, VA 23228.
  3. Draper Inc., Spiceland, IN 47385.
  4. Hunter Douglas Contract, Poway CA.
- C. Roller Window Shade System Basis of Design: Products, materials and installation methods of Draper Inc., Spiceland, IN 47385.

### **2.2 MATERIALS**

- A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
1. Bead Chain: No. 10 stainless steel chain rated to 90 pound minimum breaking strength.
    - a. Loop Length: Full length of roller shade unless otherwise indicated on Drawings.
    - b. Limit Stops: Provide upper and lower ball stops.
  2. Provide Spring Lift-Assist Mechanisms for shades as recommended by manufacturer: Manufacturer's standard for balancing roller shade weight and for lifting heavy roller shades.
- B. Roller Window Shade Components:
1. General: Provide hardware with regular drive and offset drive, reversible for left or right hand operation.
  2. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service. Provide shade rollers reversible for left- or right-hand operation.
  3. Shadeband-to-Roller Attachment: Manufacturer's standard method, enabling shadecloth to be removed without having to remove the tube from retainer brackets or without removing brackets.
- C. Shadeband Retention System: Manufacturer's standard system for guiding shadeband through range of travel and holding shadeband taut with edges of shadeband supported by side channels or angles.

- D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.
- E. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers into a multiband shade that is operated by one roller drive-end assembly.
- F. Shadebands:
  - 1. Shadeband Material: Environmentally Certified Shadecloth.
  - 2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
    - a. Type: Enclosed in sealed pocket of shadeband material.
    - b. Color and Finish: As indicated in Finish Schedule on Drawings.
- G. Accessories:
  - 1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
    - a. Shape: L-shaped.
    - b. Height: Manufacturer's standard height required to conceal roller and shadeband when shade is fully open, but not less than 4 inches.
  - 2. Guide Cables: Provide guide cables where recommended by Roller Window Shade Manufacturer.

## 2.3 FABRICATION

- A. Product Safety Standard: Fabricate roller window shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Take field measurements before preparation of shop drawings and fabrication, where possible, to ensure proper fitting of roller window shade system. Record field measurements on the submitted shop drawings. Allow for adjustments within specified tolerances wherever taking of field measurements before fabrication might delay required installation schedules.
- C. Fabricate units to completely fill openings from head to sill and jamb to jamb, measured at 74 deg F, unless specifically indicated otherwise on the Drawings. Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.
- D. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:
  - 1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.

2. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

## 2.4 FACTORY FINISHES

- A. Aluminum Components: Baked enamel in manufacturer's standard colors.
- B. Steel Components: Corrosion resistant-plated, satin-finished, or bonderized prior to painting with baked-enamel finish.

# PART 3 EXECUTION

## 3.1 INSPECTION

- A. Examine surfaces to receive the roller window shades. Installation of roller window shades constitutes acceptance of the existing conditions and substrates by the installer of the roller window shades and the roller window shade manufacturer.
- B. If deteriorated or unacceptable conditions are encountered, immediately contact the Architect.

## 3.2 INSTALLATION

- A. Install roller window shades, accessories and controls complete, level, plumb, and aligned with adjacent units in accordance with roller window shade manufacturer's printed instructions, and the final reviewed shop drawings. Surface mount roller window shades as shown on the Drawings.
- B. Anchoring:
  1. Determine the locations, quantities, capacity and design for anchors and fasteners used in the installation subject to review by the Architect.
  2. Provide anchorage devices and fasteners as required to anchor, secure or attach the window shades, accessories and controls to the in place or subsequent construction, including but necessarily limited to bolts, nuts, screws, clips, washers, toggle bolts and other devices required to complete the installation of each window shade assembly.
  3. Drill required holes in construction for anchorage of window shades and accessories. Remove and replace damaged construction.
- C. Install units within the following tolerances:
  1. Maximum variation of gap at window opening perimeter: 1/4 inch, per 8 feet (+/- 1/8 inch) of shade height.
  2. Maximum offset from level: 1/8 inch.
  3. Follow Manufacturer's edge-clearance specifications for shades where the width-to-height (W:H) ratio exceeds 1:3.

3.3 ADJUSTING

- A. Adjust units for smooth operation. Adjust shade and shadecloth to hang flat without buckling or distortion. Replace units or components which do not hang properly or operate smoothly.

3.4 CLEANING

- A. Touch up damaged finishes and repair minor damage in order to eliminate evidence of repair. Remove and replace work that cannot be satisfactorily repaired.
- B. Clean exposed surfaces, including metal and shadecloth, using non-abrasive materials and methods recommended by the Window Shadecloth Manufacturer. Remove and replace work which cannot be satisfactorily cleaned.

3.5 PROTECTION

- A. After installation, cover and protect exposed portions of the units from damage.
- B. Just prior to final acceptance, remove protective coverings and clean surfaces as recommended by roller window shade manufacturer.

**END OF SECTION**