

PROJECT:

# Kensington Fire Station #25 Renovation and Addition

Aspen Hill, MARYLAND



OWNER:

**MONTGOMERY COUNTY**

## BID SET SPECIFICATIONS

## VOLUME I

**August 28, 2017**  
**IFB # 1073301**



HG Architects  
*Architect*

Adtek  
*Civil & Structural Engineer*

Adtek  
*Structural Engineer*

S3E Klingemann  
*MEP Engineer*

TRC Consultants  
*Cost Estimator*



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**SECTION 01 1000  
SUMMARY**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 WORK COVERED BY CONTRACT DOCUMENTS**

- A. Project Identification: Kensington Fire Station 25.
1. Project Location: Aspen Hill, Maryland.
  2. Owner: Montgomery County, Maryland.
- B. Design Team Identification:
1. Architect  
Name of Firm: The Hughes Group Architects  
Street Address: 22630 Davis Drive, Suite 175  
City, State, Zip: Sterling VA 20164  
Contact Name: Ms. J. Lynn Reda, AIA,  
Phone: 703-437-6600  
Fax: 703-834-1752  
Email: Lreda@hgaarch.com
  2. Civil Engineer: Adtek Engineers
  3. Structural Engineer: Adtek Engineers
  4. Mechanical, Plumbing & Electrical Engineer: S3E Engineers
  5. Geotechnical Engineering: ECS
  6. Commissioning: Setty & Associates Inc.
  7. Construction Management: Arcadis Inc.
  8. Special Inspection Agency: Robert B. Balter Company
- C. Project Summary: The work includes but is not limited to partial demolition, an addition to and renovation of the existing Kensington Fire Station #25 (KFS 25) located at 14401 Connecticut Avenue, Silver Spring, MD 20906, in the Northeast Quadrant of the intersection of Connecticut Avenue and Bel Pre Road.

The existing Kensington Fire Station 25 is a single story building, with a partial mezzanine, totaling approximately 13,000 sf.

The work calls for demolition of a significant part of the building, leaving the existing apparatus bays. The new construction includes but is not limited to: two additional apparatus bays, redigear lockers, locker rooms for men and women, dormitory area, kitchen and dining area, training room, offices and other related uses and site work including parking and storm water management. Also included is temporary fit-out of the new apparatus bay including a kitchen area, and living facilities and temporary trailers with a sleeping area, restrooms and showers as part of the phasing for the work. The Contractor is responsible for providing the trailers and for obtaining all necessary permits for the temporary work from Montgomery County Department of Permitting services and any other authority having jurisdiction.

The project construction will be phased and the fire station will continue to be occupied and operational during construction. **The ability to ensure the smooth operation of the building 24 hours a day, every day is critical to the project.** Two customized trailers (to be supplied by the contractor as part of this contract) will provide temporary bunks/showers/lockers for fire fighters

as part of the phasing. The trailers must be permitted by Montgomery County Department of Permitting services and any other authority having jurisdiction.

The completed facility must comply with all building codes, be ADA compliant and must achieve a LEED Silver certification from the U.S. Green Building Council (USGBC) (Note: This is under the current Montgomery County requirement of LEED-NC, 2009 version 3). **An as-built drawings submission by the Contractor for Storm Water Management system and Water & Sewer system must be made by a certified State of Maryland registered Land Surveyor.**

- D. The Project has been designated as one requiring “**Special Inspections**” by the Montgomery County Department of Permitting Services. The Contractor is required to abide by all requirements of the Special Inspections program including but not limited to: Meeting with the Department of Permitting Services Special Inspection group, reading and signing the Statement of Special Inspections in order to get the Building Permit, performance of its responsibilities concerning special inspections, and preparation and submittal of required documentation in order to obtain the Use and Occupancy Permit. A link to the Special Inspection Program as required by the Department of Permitting Services is provided here:  
<http://permittingervices.montgomerycountymd.gov/DPS/pdf/SpecialInspectionProgramManual.pdf>.
- E. The Contractor shall be required to use the “Newforma Project Cloud” web based collaboration and construction management software system. The County will provide Newforma and on-line training to the Contractor if needed. The Contractor and its agents shall use the system for communication of all construction documentation and drawings. This includes, but not limited to pay applications along with supporting documentation, shop drawings, product data, RFI's, ASI's, meeting minutes, field reports, and test reports, schedules, etc.
- F. Contractor is required to provide a minimum of twenty-four (24) progress pictures at the end of every month until final completion of the project. Pictures shall document the activities performed during the preceding month. Provide photographic services similar to those provided by Multivista (678) 691-1541, located at 12003 Golf Ridge Court, #302, Fairfax VA 22033. For additional information and services, refer to Section 01 3200. One hard copy to be delivered to Architect, one hard copy to Owner. Pictures to be posted on NewForma.
- G. The Contractor shall be required to prepare Oracle Primavera P-6-or latest version CPM as approved by the Owner with cost and resource loaded based baseline and monthly progress schedules that integrate scope and cost as per GCCC Article 11. The Project Manual CSI section (summarized to CSI Division) shall be the basis of a Work Breakdown Structure (WBS) that shall be used to define activities and develop the baseline and progress schedules. The WBS shall also be the basis for developing the Schedule of Values (SOV) and payment application. The CSI section based SOV will be incorporated into the CPM.

### 1.3 CONTRACT

- A. Work will be performed under a general construction contract.
- B. Two Notice to Proceeds will be issued.
  - 1. Notice To Proceed Pre-Construction Tasks (NTP-1) is issued to provide for commencement of Pre-Construction Tasks, including but not limited to the following and as described elsewhere in Division 1 specifications. Contractor is to prepare and submit for approval:
    - a. Detailed Schedule of Values in CSI format including all subcontractors and phases.
    - b. Project CPM Schedule
    - c. Comprehensive construction site management and staging plan
    - d. Schedule of Submittals and Shop Drawings
    - e. Detailed Organization Chart

- f. List of Long Lead items
  - g. List of all subcontractors and suppliers (indicate MFD subs and suppliers)
  - h. Construction Quality Control and Safety Plan
  - i. LEED Action Plan
  - j. Waste Management Plan
  - k. Site Utilization Plan (Staging, Security, Access, Traffic, Parking, Trailer, etc.)
  - l. Electronic Project Web Site set up
  - m. Note: No mobilization will be permitted until the above tasks are completed.
2. Notice to Proceed Construction (NTP-2): This instructs the Contractor to proceed with all required construction activities. This NTP is only issued upon successful completion of Pre-Construction Tasks. Contractor must not engage in any site mobilization or construction unless and until this NTP is issued.

#### 1.4 USE OF PREMISES

- A. Use of Site: Limit use of premises to work in areas indicated on the Contract Documents and as permitted by law, ordinances and permits. Do not disturb portions of site beyond areas in which the Work is indicated.
- 1. Limits: Confine construction operations to designated areas indicated on Drawings in each phase. Vehicle access to the site shall be as indicated on the drawings.
  - 2. Access: At all times, provide Architect/Engineer and Owner easy and safe access to the Work.
  - 3. Driveways and Entrances: Keep driveways and entrances serving the premises clear and available to Owner, Owner's employees, and emergency vehicles at all times.
- B. Construction Parking: Refer to Drawings for allowable parking locations within the limits of disturbance. Arrangements for additional off-site parking and transportation to the site for construction personnel may be required by the Contractor. Contractor shall not be permitted to park on the streets in the local neighborhood even though such parking is legal.
- C. Site Access and Staging Area: Temporary staging construction activities shall be as indicated on the drawings and approved by the Owner. The Contractor will be required to coordinate its activities with the Owner
- D. Crane Use and Storage: Contractor will be allowed to house crane operations on the site. Contractor shall provide a temporary green screen chain link fence around the crane at all times. Obtain Owner and regulatory approval for any crane swing outside work area.
- E. Prevent Damage and Accidents: Contractor shall provide barriers, protections, warning lines, signs, lighting and personnel to segregate work areas from pedestrian or vehicular traffic and to prevent damage adjacent buildings, paved areas and surrounding landscaping. Contractor shall repair any damage resulting from construction activities as soon as possible after occurrence of damage. All applicable O.S.H.A., M.O.S.H. and Montgomery County Government (MCG) requirements shall be observed by Contractor.
- F. Working Hours including Noise Restrictions: The standard permitted Working Hours shall be between 7:00 a.m. and 4:00 p.m. Monday through Friday exclusive of County holidays. See General Conditions for additional information. In addition to standard work hour restrictions, the Contractor shall obtain permission from Owner and comply with the Montgomery County Department of Environmental Protection's permissible noise levels for construction activities during the hours of 7:00 am to 9:00 pm, Monday through Friday, and 9:00 am to 3:00 pm on Saturday. Noise generated by construction activities beyond these hours is strictly prohibited.
- G. Security: Refer to Section 01 5000 for required construction fence and other security requirements.
- H. Signage: Refer to Section 01 5000 for Construction and Project Signs.
- I. Site Condition: Keep project site clean. Remove trash daily.

## 1.5 WORK UNDER OTHER CONTRACTS

- A. Owner plans to award separate contracts for other construction work at Project site to be conducted simultaneously with work under this Contract. The Contractor shall be required to coordinate and cooperate with the separate contractors hired by the Owner. These contracts include, but are not limited to, the following:
1. Security System Equipment: A separate contract will be awarded to furnish and install the security systems equipment. Contractor shall provide empty conduits and junction boxes, as shown on the Contract Documents. *Contractor is required to allot sufficient time in its project schedule to accommodate work performed under separate contract to furnish and install the security systems equipment installation and testing.*
  2. Telephone and Telecommunications: A separate contract will be awarded to provide telephone and other telecommunication equipment. Contractor shall provide conduits, junction boxes, back boxes, plates, patch panels and all data cabling as shown on the Contract Documents including testing. *Contractor is required to allot sufficient time in its project schedule to accommodate work performed under separate contract to provide telephone and other telecommunication equipment installation and testing.*
  3. Inspection and Testing Services: A separate contract will be awarded to provide inspection and testing services. Refer to Section 014000 and the referenced Sections therein for inspection and testing services which are the Owner's responsibility.
  4. Commissioning: A separate contract will be awarded to manage commissioning. See Contractor commissioning requirements elsewhere in the Contract Documents. *Contractor is required to allot sufficient time in its project schedule to accommodate mechanical and electrical commissioning work performed under separate contract.*
  5. ADA Commissioning: A separate contract will be awarded for an ADA compliance Agent. The Contractor must work with the agent to provide access, documents and information to verify compliance with ADA regulations. *Contractor is required to allot sufficient time in its project schedule to accommodate ADA commissioning work performed under separate contract.*
  6. Exterior Envelope Commissioning: A separate contract will be awarded for exterior envelope oversight and commissioning. The Contractor must work with the agent to provide access, documents and information to verify compliance with ADA regulations. *Contractor is required to allot sufficient time in its project schedule to accommodate ADA commissioning work performed under separate contract.*
  7. Furniture and Equipment: A separate contract will be awarded to provide loose furniture and equipment not included in the Contract Documents.
  8. Construction Management Services: A separate contract will be awarded to provide construction management services to assist the Owner in carrying out their obligations.
  9. Radio alerting System: A separate contract will be awarded to furnish and install the Radio Alerting equipment. Contractor shall provide empty conduits and junction boxes, as shown on the Contract Documents. *Contractor is required to allot sufficient time in its project schedule to accommodate work performed under separate contract to furnish and install the radio alerting system installation and testing.*
  10. Owner may also award separate contracts for other miscellaneous construction items at Project site.

- B. Cooperate fully with these separate Owner-hired contractors so work on those contracts can be carried out smoothly, without interfering with or delaying work under this Contract. Refer to Article 7 of the General Conditions of Contract for specific information concerning this issue.

#### 1.6 OWNER-FURNISHED PRODUCTS

- A. The following shall apply to Owner-furnished products:
  - 1. Products noted as "Owner furnished" shall be furnished by the Owner and installed by the Contractor.
  - 2. Products noted as "Owner furnished and Owner installed" shall be furnished and installed by the Owner.
- B. For Owner-furnished products installed by the Contractor:
  - 1. Owner will provide Contractor with any shop drawings and/or product data as required for the installation of the Owner-furnished items. The Contractor shall review shop drawings and/or product data and shall promptly notify the Architect/Engineer and the Owner of any concerns or anticipated problems with installation and/or use of each item.
  - 2. Owner will coordinate with Contractor to furnish Contractor the anticipated delivery date for Owner-furnished products. Using Owner-furnished delivery dates, Contractor shall designate delivery and installation dates of Owner-furnished items in the Contractor's Construction Schedule.
  - 3. Owner will arrange and pay for delivery of Owner-furnished items according to Contractor's Construction Schedule as approved by the Owner. The Work includes the Contractor providing support to receive and handle Owner's products at project site. Contractor shall arrange for the disposal of any packing material, boxes, etc. associated with Owner-furnished items.
  - 4. After delivery, Owner and Contractor will jointly inspect delivered items for completeness and any damage.
  - 5. If Owner-furnished items are damaged, defective, or missing, Owner will, at its option, arrange for replacement or direct to install product as received.
  - 6. Contractor is responsible for protecting Owner-furnished items from damage during site storage, handling including damage from exposure to the elements, and installation. If Owner-furnished items are damaged as a result of Contractor's operations, Contractor shall replace them or repair them to Owner satisfaction.
  - 7. Owner is responsible for manufacturer's warranties, inspections and service.
- C. For Owner-furnished products installed by the Owner:
  - 1. Site Access: Contractor shall provide access to Project site for Owner's construction forces.
  - 2. Coordination: Contractor shall coordinate construction and operations of the Work with work performed by Owner's construction forces.
    - a. 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.

- b. Pre-installation Conferences: Include Owner's construction forces at pre-installation conferences covering portions of the Work that are to receive Owner's work. Attend pre-installation conferences conducted by Owner's construction forces if portions of the Work depend on Owner's construction.
- D. Furniture and Loose Equipment: The Owner will provide and install furniture and loose equipment denoted as "NIC" on the Contract Documents.
- E. A geotechnical report. See section 02 3000

#### 1.7 PERMITS

- A. Refer to General Conditions for Owner-obtained and for Contractor-obtained permits.
- B. Contractor is responsible for all requirements of all permits, whether Owner-obtained or Contractor-obtained.
- C. Contractor is required to prepare and maintain all documentation for all project-related local, state and federal permits.
- D. Contractor is responsible for maintaining all permits and renew/extend them as necessary, until Final Completion of the project and final close out of all permits.

#### 1.8 TAXES

- A. Refer to General Conditions.

#### 1.9 ADAAG

- A. Contractor to be aware of 2010 ADA Standards for Accessible Design as indicated in the contract documents and shall prepare and install the specified materials in accordance with the guidelines contained within the above standards.

#### 1.10 UTILITY COORDINATION

- A. Once the General Contractor has received the Notice-to-Proceed 1 (NTP-1) for the project, the General Contractor will take on the responsibility of being the main correspondent between the project and all utilities inherent in the project. The General Contractor's duties will include the following:
  - 1. All site work related submittals for the project must be submitted by the General Contractor no later than 60 days from the Notice-to-Proceed (NTP-1) from the County to the General Contractor for each phase. All Utility work to be shown on the ICPM and all CPM schedules.
  - 2. The General Contractor will be solely responsible for the coordination of all utilities inherent in the project. Any delay in response to the General Contractor's submittal by any of the project's utility companies will be considered non-compensable should the delay effect the construction critical path of the project's sequence of construction.
  - 3. The General Contractor is solely responsible for all bond and permit costs for all utilities required by the project.
  - 4. Within sixty (60) days of Notice To Proceed (NTP-1) Contractor must test pit location of all existing utilities with new utility services' locations prior to starting of utility work to confirm location of existing utilities in order to resolve any conflict.
  - 5. Contractor must perform utility connection work within 120 days of issuance of NTP-2 in the street/road/ROW and bring utility services to within 5 feet of property line or Limit of

Disturbance, unless not permitted during that time by the approved sequence of construction.

6. Contractor must schedule and perform work in such a manner that all permanent utility services such as gas, power, sewer, water and communication, etc. are ready for use a minimum of 120 days prior to project Substantial Completion date.

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

**PART - EXECUTION (NOT USED)**

**END OF SECTION**





**SECTION 01 1100**  
**GRAND OPENING REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SCOPE**

- A. The Contractor shall provide the items specified in this Section to facilitate a Grand Opening to be held by the Owner for the Project.
- B. Tents, Tables and Chairs: The Contractor shall provide two 25' x 25' "open air" tents, 50 folding chairs, and three 30"x 60" folding tables. Contractor shall obtain all permits required for tents.
- C. Bottled Water: The Contractor shall provide at least one hundred forty four (144) bottles of drinking water for use by Grand Opening attendees (officials and the general public).
- D. The Owner shall provide any lectern and/or sound system needed for the Grand Opening.
- E. Contractor shall supply power through the use of a generator or a connection to a permanent electrical outlet. If a generator is required, it should be located at a distance to minimize the noise at the Grand Opening.

**1.3 COORDINATION**

- A. The Contractor shall coordinate the Grand Opening events with County officials. The coordination shall include one on-site meeting with County officials.
- B. The Contractor shall have a responsible representative at the site a minimum of two hours prior to the Grand Opening event.

**PART 2 - PRODUCTS**

- 2.1 PRODUCTS: See Paragraph 1.2 for requirements for tents, tables, chairs and bottled water.

**PART 3 - EXECUTION**

- 3.2 GRAND OPENING DATE SET-UP: The Contractor shall set up all other parts of its requirements at least six hours prior to the event.
- 3.3 GRAND OPENING CLEAN-UP: The Contractor shall remove all of its Groundbreaking requirements within two (2) hours after the end of the Groundbreaking event.

**END OF SECTION**



**SECTION 01 2100  
ALLOWANCES**

**PART 1 GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes administrative and procedural requirements governing allowances.
  - 1. Certain items are specified in the Contract Documents by Allowances. Some Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when further direction will be provided to Contractor. If necessary, additional requirements will be issued by the Owner and/or Architect.
- B. Types of Allowances may include the following:
  - 1. Lump-sum allowances.
  - 2. Unit-cost allowances.
  - 3. Quantity allowances.
  - 4. Contingency allowances.
  - 5. Testing and inspecting allowances.
- C. Related Requirements:
  - 1. Division 01 Section "Unit Prices" for procedures for using unit prices.
  - 2. Division 01 Section "Quality Requirements" for procedures governing the use of allowances for testing and inspecting.
  - 3. Divisions 02 through 33 Sections for items of Work covered by allowances.
  - 4. General Conditions of Construction Contract (GCCC) Article 5.

**1.3 SELECTION AND PURCHASE**

- A. At the earliest practical date after award of the Contract, advise Architect of the date when final selection and purchase of each product or system described by an allowance must be completed to avoid delaying the Work.
- B. At Architect's request, obtain proposals for each allowance for use in making final selections. Include recommendations that are relevant to performing the Work.
- C. Purchase and install products and systems selected by Architect from the designated supplier after approval by the Contract Administrator.
- D. Any unused lump-sum allowance funds described in the Schedule of Allowances below, may be used at Owner's discretion.

**1.4 ACTION SUBMITTALS**

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

**1.5 INFORMATIONAL SUBMITTALS**

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

- C. Coordinate and process submittals for allowance items in same manner as for other portions of the Work.

#### 1.6 COORDINATION

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

#### 1.7 ADJUSTMENT OF LUMP-SUM, UNIT-COST, CONTINGENCY AND/OR QUANTITY ALLOWANCES

- A. Allowances designated in the Contract Documents provide for the estimated direct cost of all labor, materials and equipment, including unloading, storage, and handling at the Site, labor, installation costs, transportation to the Site and all required taxes, less applicable trade discounts but do not include the Contractor's overhead or profit, which are included in the Contract Sum and are not compensable under the Allowances.
- B. Whenever actual costs (excluding those amounts indicated above as included in the Contract Sum and not compensable) are more than a monetary Allowance, the Contractor may be entitled to an appropriate Contract Modification to reflect only the difference between actual costs and the amount of the Allowance; if actual costs are less or equal to the amount of a monetary Allowance, the Contractor may include only such actual costs in the Contractor's Application for Payment.
- C. The Contract Sum must be reduced by an appropriate Contract Modification to reflect the deletion of an Allowance or lower actual costs of an Allowance; and use unit costs provided to increase or decrease amounts based on actual amounts required.
- D. All time required for the performance of work covered by an Allowance is conclusively presumed to be included in the Contract Time, unless the cost of the allowance work exceeds the Allowance and the Contractor, before the Allowance is authorized, demonstrates a Delay to the critical path of the Contractor's Progress Schedule and requests an extension of time in writing in accord with GCCC Article 11. All such Delays are non- compensable.
- E. Use any contingency allowance only as directed by the Owner.
- F. Unused Materials: Return unused materials purchased under an allowance to manufacturer or supplier for credit to Owner, after installation has been completed and accepted.
  - 1. If requested by Architect, retain and prepare unused material for storage by Owner. Deliver unused material to Owner's storage space as directed.

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

### **PART 3 EXECUTION**

#### 3.1 EXAMINATION

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

#### 3.2 PREPARATION

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

#### 3.3 SCHEDULE OF ALLOWANCES

The total cost of the following allowances shall be included as part of the base bid.

These allowances shall only be used by the Owner, as directed by Owner for changes in work due to any or all of the following:

**A. ALLOWANCE 1: \$50,000**

To be used for any or all of the following:

- i. Cell Phone Booster Infrastructure and/or modification to bi-directional amplification system to support Public Safety 800 MHz radio system – allowance to include all conduit, power and associated infrastructure for the installation of a signal boost system.
- ii. Audio Visual Equipment – To include building paging, induction loop systems, local sound systems etc.
- iii. Exercise Equipment – contractor to purchase and install exercise equipment as per Owners Specifications
- iv. DPS requirements – to meet DPS requests in excess of what is shown on drawings
- v. For repair work due to damages of temporary use of completed spaces due to phasing requirements.

**END OF SECTION**



**SECTION 01 2200  
UNIT PRICES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for unit prices.
- B. Related Sections include the following:
  - 1. Division 1 Section "Contract Modification Procedures" for procedures for processing changes.

**1.3 DEFINITIONS**

- A. A Unit price is an Owner-established amount stated on the following Schedule of Unit Prices to be used as a price per unit of measurement for referenced materials or services added to or deducted from the Contract by appropriate Contract Modification. Unit prices are applicable for change work only and are not utilized in the Base Bid work.
- B. By submitting a bid, the Contractor acknowledges acceptance of the established Unit Prices for their use in determining the value of change work. Prices as stated will remain in effect until final completion of the Contract.
- C. Performance of Work not authorized by a Change Order or Field Order, whether or not such work is set forth hereunder as a Unit Price item, shall not be considered cause for extra payment beyond the Contract Sum. The Schedule of Unit prices has no impact, effect, or role on Base Contract Work

**1.4 PROCEDURES**

- A. Unit prices include all Contractor cost/credit for indicated unit of work including, but not limited to costs for: material, labor, tools, equipment, delivery, handling, protection, supervision, installation, testing, insurance, bond, taxes, overhead, and profit.
- B. Measurement and Payment: Contractor shall be responsible for measurement of Change work performed utilizing unit prices; however, the Contractor must notify the Architect/Engineer and Owner in sufficient time prior to commencing this work to allow proper Owner monitoring of any measurements. Only quantities which have been approved in writing by the Owner will be considered in any Contract Modification. Payment for change work will be per Division 1 Section "Contract Modification Procedures".
- 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.
- D. All change work performed utilizing unit prices shall be done per Contract Documents. Unit prices are for work in place, unless noted otherwise.
- E. Schedule of Unit Prices: A Schedule of unit prices is included below. This will be updated with the amounts from "Attachment V: Unit Prices" included in the RFP submission upon selection of the successful contractor.

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

**PART 3 - EXECUTION****3.1 SCHEDULE OF UNIT PRICES**

NO	DESCRIPTION	UNIT	UNIT COST
1	Earth Excavation – Machine.	Cu. Yd.	
2	Earth Excavation - Hand.	Cu. Yd.	
3	Haul Excavated Material off site.	Cu. Yd.	
4	Excavate and remove unsuitable material from site.	Cu. Yd.	
5	Remove nonhazardous contaminated soil due to oil tank spillage.	Cu. Yd.	
6	Furnish, deliver, spread & compact imported fill material as specified in contract document.	Cu. Yd.	
7	Furnish, deliver, spread, and compact gravel base – #57 stone.	Cu. Yd.	
8	Provision and installation of 3500 psi concrete with W6xW6 welded wire mesh for sidewalks/slabs on grade.	Cu. Yd.	
9	Provision and installation of 8" reinforced concrete slab as per detail 5 sheet CP-508		
10	Furnish and install sod.	Sq. Yd.	
11	Traffic Membrane Coating installed	Sq. Ft.	
12	Fire Alarm Strobe: Provide 110-cd ceiling-mounted strobe and 50 Ln/Ft for fire alarm cabling in fire alarm rated MC cabling. Provide all programming and testing.	Per Location	
13	Fire Alarm Speaker/Strobe Unit: Provide 110-cd wall-mounted strobe and horn device and 100 Ln/Ft of fire alarm cabling in fire alarm rated MC cabling. Provide all programming and testing.	Per Location	
14	Exit Sign: Provide exit light and 20-feet of conduit and wire.	Each	
15	Light Switch: Provide 1P, 20A toggle switch, including box, cover plate, and 100-feet of conduit and wiring.	Each	
16	Fire Alarm Pull Station: Provide a manual fire alarm pull station complete with 100-feet of fire alarm wiring in fire alarm rated MC cabling. Include all testing and programming of device.	Each	
17	Typical non rated stud wall: See wall type 0S.	Sq. Ft.	
18	8" CMU grouted masonry wall as specified in Contract Documents. Painted.	Sq. Ft.	
19	6" CMU grouted masonry wall as per specified in Contract Documents. Painted.	Sq. Ft.	
20	Type EMT Conduit 3/4" with 2 #12AWG & 1#12 Ground Types THHN-THWN insulated conductors.	Ln. Ft.	
21	Type MC Cable with 2 #12AWG & 1#12 Ground Types THHN-THWN insulated conductors.	Ln Ft.	
22	Data Outlet and 100 ft of Cat 6 cabling	Each	
23	Power Outlet and 100 ft of wiring and connection to panel	Each	
24	Floor Outlet Type 1 and 100 ft of wiring and connection to panel	Each	
25	Floor Outlet Type 2 and 100 ft of wiring and connection to panel	Each	
26	Carpet tile installed with required floor preparation as per project specifications.	Sq. Yd.	
27	Rubber Athletic Flooring installed with required floor preparation as per project specifications.	Sq. Ft.	



**END OF SECTION**



**SECTION 01 2300  
ALTERNATES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for provision of additive and/or deductive Alternates. The Owner may elect to add and/or deduct the specified Alternates to the work in consideration for a change to the Contract Sum without a change in the Contract Time. The Owner may elect to accept any combination of alternates.
- B. Bidders must submit, with their bids, prices for all Alternates listed in the Schedule of Alternates and the Proposal Form. If Alternates are accepted by the Owner, they will be indicated in the Contract and the Contract Sum will be adjusted by the amount provided on the Proposal Form.

**1.3 DEFINITIONS**

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

**1.4 PROCEDURES**

- A. Coordination: Modify or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.
- B. Alternate prices shall include all costs to implement the Alternate work including but not limited to costs for: material, equipment, labor, delivery, installation, insurance, overhead, profit and taxes.
- C. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated modifications to alternates.
- D. Execute accepted alternates under the same conditions as other work of the Contract.
- E. Schedule: A Schedule of Alternates is included at the end of this Section. The Contract Documents, whether referenced in the Schedule or not, specify requirements to perform the work described under each alternate.

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

**PART 3 – EXECUTION**

### 3.1 SCHEDULE OF ALTERNATES

#### SCHEDULE OF DEDUCT ALTERNATES

1. Alternate No. 1 (Deduct): South Pergola  
Base Bid Scope - Aluminum Pergola and structure  
**Value:** \_\_\_\_\_
  - A. Alternate 1A - Eliminate South Pergola and all associated structure, etc. Reference details A1/A122, A5/A311, S103, and S104.  
**Value:** \_\_\_\_\_
  - B. Alternate 1B – Construction of Pergola system with Glue Laminated and Timber construction in lieu of aluminum system.  
**Value:** \_\_\_\_\_
2. Alternate No. 2 (Deduct): Lobby 101 and Corridors 109, 110, 111 and 122, and Coffee/Copy 117 Floor Finish  
Base Bid Scope - Porcelain tile flooring.  
**Value:** \_\_\_\_\_
  - A. Alternate 2A - Provide Reactive Chemical **Concrete Stain** with 4" rubber base.  
BASIS OF ALTERNATE DESIGN: Scofield's LITHOCHROME Chemstain Classic (Or Approved Equal)
    - i. Preparation:
      - (a) Newly placed concrete to sufficiently cure for concrete to become reactive. Minimum cure time is 14 days.
      - (a) Interior Applications: Minimum cure time of concrete is 30 to 60 days, or longer if necessary to meet the specified water vapor transmission requirements.
      - (a) Do not use liquid curing materials. Cure concrete flatwork with new, unwrinkled, non-staining, high quality curing paper complying with ASTM C 171. Do not overlap curing paper.
      - (a) Immediately prior to chemically staining, thoroughly clean concrete to remove any contaminants deleterious to subsequent chemical stain application. Sweep surfaces, then pressure wash or scrub using a rotary floor machine with a Mal-Grit Brush from the Malish Corporation. Use suitable, non-acidic, high quality commercial detergents to facilitate cleaning. Rinse surfaces after cleaning until rinse water is completely clean. Allow floor to dry completely prior to application of concrete stain.
        - (1) Pressure Washing: Use a pressure washer equipped with a fan tip and rated for a minimum pressure capability of 4000 psi.
    - ii. Sealing Application:
      - (a) Concrete substrate must be completely dry. Test surface for proper pH prior to applying sealer. A pH value of 7 or higher indicates all acid has been neutralized. If the tested pH value is less than 7, repeat neutralization step until the required pH value is achieved.
      - (a) Conduct a moisture vapor emission test prior to applying any sealer. Refer to the specific sealer's Technical-Data Bulletin for acceptable MVER.
      - (a) Apply sealer according the sealer manufacturer's printed instructions at a rate of 300 to 500 square feet per gallon per coat. Maintain a wet edge at all times.

- (a) Allow sealer to completely dry before applying additional coats.
- (a) Apply second coat of sealer at 90 degrees to the direction of the first coat using the same application method and rates.
- (a) Seal horizontal joints in areas subject to pedestrian or vehicular traffic.

**Value:** \_\_\_\_\_

**B. Alternate 2B- Provide Integrally Colored Concrete with 4" rubber base.**

BASIS OF ALTERNATE DESIGN: Colored Admixture for Integrally Colored Concrete: CHROMIX® Admixtures for Color-Conditioned Concrete including CHROMIX P® Admixtures, CHROMIX ML® Admixtures or CHROMIX L® Admixtures (Or Approved Equal)

i. Installation:

- (a) Install concrete according to requirements of Division 3 Section "Cast-In-Place Concrete".
- (b) Do not add water to concrete mix in the field.
- (c) Surfaces shall be finished uniformly with the following finish:
- (d) Trowel: Precautions should be taken to ensure that the surface is uniformly troweled so that it will not be slippery. Do not over-trowel or burnish the surface.
- (e) Rock Salt: Trowel concrete. Then sprinkle salt on concrete and press into surface leaving only tops of salt grains exposed. After 24 hours, wash salt away with water and brush. Allow surface and impressions to dry before applying curing compound.

ii. Curing:

- (a) Integrally Colored Concrete: Apply curing and sealing compound for integrally colored concrete according to manufacturer's instructions using manufacturer's recommended application techniques. Apply curing and sealing compound at consistent time for each pour to maintain close color consistency.
- (b) Curing compound shall be same color as the colored concrete and supplied by same manufacturer of the colored admixture.
- (c) Precautions shall be taken in hot weather to prevent plastic cracking resulting from excessively rapid drying at surface as described in CIP 5 *Plastic Shrinkage Cracking* published by the National Ready Mixed Concrete Association.
- (d) Do not cover concrete with plastic sheeting.

**Value:** \_\_\_\_\_

3. Alternate No. 03 (Deduct): Dining Area 136, Panty 137 and Kitchen 138 Floor Finish.  
Base Bid Scope - Porcelain tile flooring.

**Value:** \_\_\_\_\_

A. Alternate 3A - **Same basis of design as Alternate 2A above.**

**Value** \_\_\_\_\_

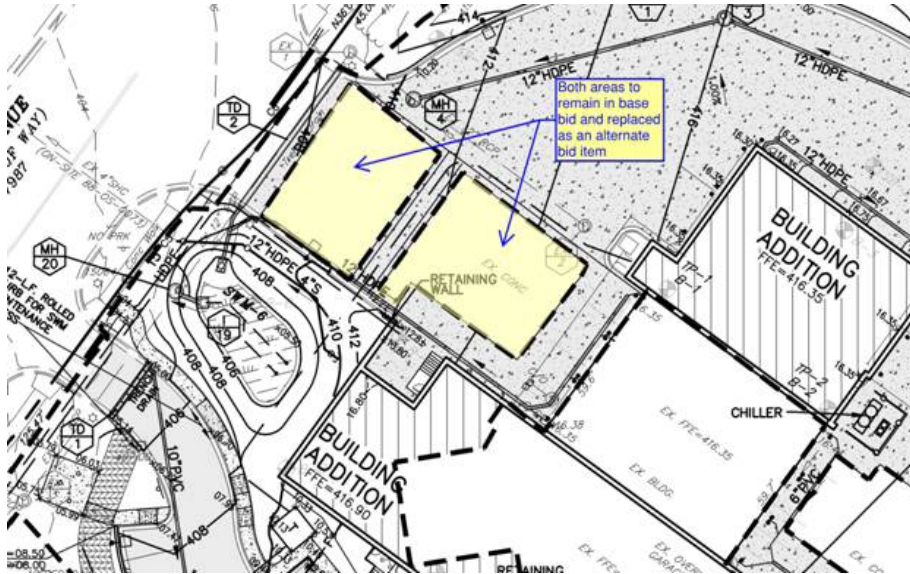
B. Alternate 3B- **Same basis of design as Alternate 2B above.**

**Value:** \_\_\_\_\_

4. Alternate No. 04 (Deduct): Prefinished Gutter Fascia Box  
Base Bid Scope - Continuous Prefinished Gutter Fascia Box  
**Value:** \_\_\_\_\_
- A. Alternate 04A - Eliminate prefinished gutter fascia box surround at plan North and East roofs only. Reference detail A3/A324.  
**Value:** \_\_\_\_\_
5. Alternate No. 05 (Deduct): Prefinished Gutter Fascia Box  
Base Bid Scope- Continuous Prefinished Gutter Fascia Box  
**Value:** \_\_\_\_\_
- A. Alternate 05A - Eliminate Prefinished Gutter Fascia Box throughout. Reference detail A3/A324.  
**Value:** \_\_\_\_\_

#### **SCHEDULE OF ADD ALTERNATES**

6. Alternate No. 06 (Add): Curtain Wall systems in lieu of Storefront system  
Base Bid Scope - Kawneer Tri-Fab VG (VersaGlaze) 451T 2" x 4 1/2" storefront system.  
**Value:** \_\_\_\_\_
- A. Alternate 06A - Provide Kawneer 1600 Wall System 2 Curtain Wall 2 1/2" x 6" throughout. (Or Approved Equal)  
**Value:** \_\_\_\_\_
7. Alternate No. 07 (Add): Fire House Driveway Apron  
Base Bid Scope - Remove and replace only the areas of the apron where new utilities are installed as shown in plans. Contractor to schedule and perform work with the understanding that the Fire Station is to remain open at all times. The new concrete must match the existing grades of the driveway apron to remain.
- A. Alternate 07A - Remove the entire driveway apron and replace with new concrete apron at the same elevations. Contractor to schedule and perform work with the understanding that the Fire Station is to remain open at all times. Demolition and Installation of these areas cannot be performed until such time that the SWM as-builts have been approved and the Sediment Control Permit has been closed. See Exhibit i below.
- Value:** \_\_\_\_\_
- i. Exhibit:



8. Alternate No. 08 (Add): Toilet Room 142A adjacent to Apparatus Bay.  
Base Bid Scope - No Toilet Room

A. Alternate 08A

- i. Add 75 CFM exhaust fan, similar to Greenheck SP-B110 with 100' of 6x6 ductwork with four elbows.
- ii. Provide power to exhaust fan (80w) controlled by wall mounted occupancy sensor and a GFI outlet located next to lavatory.
- iii. Provide 2x4 light fixture, Type A2, controlled by wall mounted occupancy sensor.
- iv. Provide 1-1/2" cold water line to water closet P-1.
- v. A new centered floor drain will be installed in new Toilet Room similar to room 102.
- vi. Include provisions for 1/2" hot and cold water lines to the lavatory.
- vii. Provide toilet, toilet paper dispenser, paper towel dispenser and receptacle, and mirror similar to room 102.
- viii. Provide wall mounted sink and faucet; BASIS OF DESIGN: American Standard – Comrade or similar, American Standard – Stratton or similar
  - (a) Acceptable Manufactures:
    - (i) Kohler
    - (ii) American Standard
    - (iii) Moen
    - (iv) Delta Faucet
  - (a) Insulate pipes under sink.
- ix. Provide Porcelain tile floor (and aluminum floor transition/threshold), 4" tile floor base, wall and ceiling finishes similar to Toilet Room 102.
- x. Provide painted galvanized hollow metal door and frame similar to door 147, with privacy hardware similar to Door 102.

**Value:** \_\_\_\_\_

9. Alternate No. 09 (Add): Blackout Shades in Dayroom 135  
Base Bid Scope - Manual horizontal louver blinds.

**Value:** \_\_\_\_\_

- A. Alternate 09A - Complete installation of manually operated blackout shades in Dayroom  
135. BASIS OF DESIGN: MechoShade Systems, Inc., Classic Mecho®/5 roller-shade system (Or Approved Equal)

**Value:** \_\_\_\_\_

10. Alternate No. 10 (Deduct): Apparatus Bay MEP utilities

Base Bid Scope - Selective demolition of existing elements with upgrades to exterior envelope and interior finishes. Base MEP scope includes:

- i. Mechanical:
  - (a) Relocate existing Plymovent Vehicle exhaust fan from the exterior of the building to inside of existing apparatus bay.
  - (a) Replace infrared heating system, ventilation system, and modify Plymovent design to provide a single exhaust fan to serve both apparatus bays.
  - (b) Tie infrared heaters and ventilation system into new building automation system.
- ii. Electrical:
  - (a) Provide new lighting in the existing apparatus bay.
  - (a) Provide power to new bay doors.
  - (a) Provide new fire alarm devices.
  - (a) Provide new fire alert devices.
  - (a) Replace all receptacles and provide new wiring to receptacles and new electrical cord reels
- iii. Plumbing:
  - (a) Demolish existing domestic water lines to exterior hose bibbs.
  - (a) Connect compressed air reel to new station air compressor.
  - (a) Run new gas line, domestic water line, and sprinkler line across existing bay to connect renovated admin area to new apparatus bay and support addition.
  - (a) Provide new hose reels.
  - (a) Adjust the design and layout of the compressed air piping to accommodate design change to locate station air compressor on the new mezzanine as opposed to the existing mezzanine.
  - (a) Provide all new domestic water piping in the existing apparatus bay and gas piping to new infrared unit heaters
- iv. Fire Protection:
  - (a) Existing sprinkler piping and sprinkler heads will remain. System will be connected to the new water service for the fire station.
  - (a) Demolish sprinkler line to exterior flush mounted fire department connection.

**Value** \_\_\_\_\_

A. Alternate 10A - Complete installation of the following MEP systems:

- i. Mechanical:
  - (a) Replace infrared heating system, ventilation system, and modify Plymovent design to provide a single exhaust fan to serve both apparatus bays.
- ii. Electrical:
- iii. Replace all receptacles and provide new wiring to receptacles and new electrical cord reels.
- iv. Plumbing:
  - (a) Provide new hose reels.



- (a) Adjust the design and layout of the compressed air piping to accommodate design change to locate station air compressor on the new mezzanine as opposed to the existing mezzanine.
- (a) Provide all new domestic water piping in the existing apparatus bay and gas piping to new infrared unit heaters.

**Value:** \_\_\_\_\_

**END OF SECTION**



**SECTION 01 2600**  
**CONTRACT MODIFICATION PROCEDURES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications. Articles 11 and 12 of the General Condition of Contract contain detailed contractual requirements for Contract Modifications which must be followed in addition to requirements in this Section.
- B. Related Sections include the following:
  - 1. Division 1 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

**1.3 MINOR CHANGES IN THE WORK**

- A. Architect/Engineer may issue Supplemental Instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time. If the Contractor contends that any Supplemental Instructions constitute a Change, it shall notify the Architect/Engineer and Owner of such within the time limit specified in the General Conditions of the Contract and shall prepare a Contractor-Initiated Proposal as indicated in 1.4.B below.

**1.4 PROPOSAL REQUESTS**

- A. Owner-Initiated Proposal Requests: For any Owner-initiated proposal requests, the Architect/Engineer or the Owner will issue a detailed description of any proposed change in the Work that may require adjustment to the Contract Sum and/or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
  - 1. Proposal Requests issued by Architect/Engineer or Owner are for information only. Do not consider them instructions either to stop work in progress or to execute the proposed change.
  - 2. Upon receipt of Proposal Request, submit a quotation indicating the adjustments to the Contract Sum and/or the Contract Time necessary to execute the change.
    - a. For any requested change to the Contract Sum, the Contractor must provide a detailed cost breakdown of all costs/credits required to perform the change. Cost breakdown shall include but not be limited to: defined material and equipment costs including quantities and unit costs with trade discounts, defined labor costs including man-hours and hourly rates, applicable taxes, delivery charges, profit, overhead, bond, and insurance costs. If requested, furnish survey data to substantiate quantities.
    - b. For any requested extension to the Contract Time, the Contractor must provide the information specified in Article 11 of the General Conditions of Contract including 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.
  - 3. Contractor must certify that all cost information submitted (including that submitted by subcontractors) is, to the best of Contractor's knowledge, legitimate, fair and reasonable, and has met all contract requirements.

- B. Contractor-Initiated Proposals: If latent, unforeseen, or other conditions (including Contract Document deficiencies) require a Contract modification, the Contractor shall submit a request for a change.
1. If the Contractor discovers a condition, requiring a Contract Modification, that requires technical direction from the Architect/Engineer and/or the Owner, the Contractor shall immediately notify the Architect/Engineer and the Owner of such. If the Owner concurs, an Owner-initiated Proposal Request will be generated and the procedure outlined in 1.4.A above will be followed.
  2. If the Contractor discovers a condition requiring a Contract Modification but not requiring technical direction, the Contractor shall issue a statement to the Owner and Architect/Engineer 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.
  3. For any requested change to the Contract Sum, the Contractor must provide a detailed cost breakdown of all costs/credits required to perform the change. Cost breakdown shall include but not be limited to: defined material and equipment costs including quantities and unit costs with trade discounts, defined labor costs including man-hours and hourly rates, applicable taxes, delivery charges, profit, overhead, bond, and insurance costs. If requested, furnish survey data to substantiate quantities.
  4. Contractor must include, with the submittal of any proposed change, a statement certifying that the Contractor's and any subcontractors' costs and/or time extension requests are fair, reasonable, and legitimate for the proposed work.
  5. For any requested extension to the Contract Time, the Contractor must provide the information specified in Article 11 of the General Conditions of Construction Contract including 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 Division 1 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
  7. Contractor must certify that all cost information submitted (including that submitted by subcontractors) is, to the best of Contractor's knowledge, legitimate, fair and reasonable, and has met all contract requirements.

#### 1.5 CHANGE INSTRUMENTS

- A. Changes in the scope of the Contract may be effected only by a written Amendment signed by the Owner and Contractor. Changes in the Work which are within the general scope of the Contract may be effected by a written and executed Change Order or Field Order. The Owner reserves the right to modify a Field Order to a Change Order at its discretion.
- B. Change Order: A Change Order is a written order signed by the Owner (Director, Office of Procurement) directing the Contractor to perform a Change in the Work. If time or circumstances do not allow issuance of a Bilateral Change Order (i.e. signed by Owner and Contractor), the Owner will issue a Unilateral Change Order (i.e. signed by Owner only) directing a Change. The Contractor must proceed diligently with the Change work upon receipt of any executed Change Order. A Change Order may be used to adjust the Contract Sum and/or the Contract Time. Cumulative Change Orders of \$100,000.00 or greater are subject to Owner's Contract Review Committee (CRC) approval.
- C. Field Order: A Field Order is a written instruction issued by the Contract Administrator to the Contractor directing a change in the Work when unforeseen and unanticipated conditions arise which require immediate action to mitigate costs or avoid delays. It may provide for additional compensation to be paid to the Contractor (outside of the Contract), but does not change the Contract Time or Contract Sum. If any Field Order results in a time extension request by the Contractor, time shall be dealt with as a Change Order. If time or circumstances do not allow

issuance of a Bilateral Field Order (i.e. signed by Contract Administrator and Contractor), the Contract Administrator will issue a Unilateral Field Order (i.e. signed by Contract Administrator only) directing a Change. The Contractor must proceed diligently with the Change work upon receipt of any executed Field Order.

#### 1.6 COORDINATION

- A. Promptly, and before the next Application for Payment submission, revise the Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum as shown in the Change Order. Record and invoice Field Order amounts separately.
- B. Promptly, and before the next Progress Schedule submission, revise the project Progress Schedule to reflect any change in Contract Time authorized by Change Order; revise schedule to adjust times for other items of work affected by the change.

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

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

**END OF SECTION**



**SECTION 01 2900  
PAYMENT PROCEDURES**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.
- B. Related Sections include the following:
  - 1. Division 1 Section "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
  - 2. Division 1 Section "Construction Progress Documentation" for administrative requirements governing preparation and submittal of Contractor's Construction Schedule and Submittals Schedule.
  - 3. Division 1 Section "Quality Requirements" for additional requirements for payments.

**1.3 DEFINITIONS**

- A. Schedule of Values: A statement furnished by Contractor, and approved by the Architect/Engineer and the Owner, allocating portions of the Contract Sum to various portions of the Work and used as the basis for reviewing and processing Contractor's Applications for Payment.

**1.4 SCHEDULE OF VALUES**

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's initial Construction Schedule (ICPM).
  - 1. Correlate line items in the Schedule of Values with other required administrative forms and schedules, including the following:
    - a. Application for Payment forms with Continuation Sheets.
    - b. Submittals Schedule.
  - 2. Submit the Schedule of Values to Architect/Engineer and Owner for approval within 10 days after issuance of Notice to Proceed 1 and at least seven (7) days before initial requisition for payment. The Schedule of Values must be approved by the Contract Administrator prior to approval of contractor's initial requisition for payment.
  - 3. Subschedules: Where the Work is separated into phases requiring separately phased payments, provide subschedules showing values correlated with each phase of payment.
  - 4. Schedule of Values shall be broken down into work packages under each CSI section.
  - 5. The following items shall be included as separate items in the Schedule of Values:
    - a. Preparation, Submission and approval of project As-Built Drawings.
    - b. Preparation, Submission and approval of Operation and Maintenance Manuals
    - c. Preparation, Submission and approval of As-Built Drawings for Storm Water Management by the Authority having Jurisdiction. As-built drawings must be certified by a State of Maryland registered Land Surveyor.
    - d. Preparation, Submission and acceptance of required LEED documents
    - e. Contractor Coordination, participation and acceptance of Systems Commissioning.

- f. Preparation, submission and acceptance of Water and Sewer as built drawings the Authority having Jurisdiction. As-built drawings must be certified by a State of Maryland registered Land Surveyor.
- g. General Conditions cost shall be itemized by separated line items such as Bonds, Insurance, temporary sanitary conditions, utilities, temporary facilities for owner and contractor, telecommunications, CQC, superintendent, small office equipment, office supplies.
- h. Contract Allowances itemized as per contract documents

Billing for these items will not be accepted by the County until the final submission is made and accepted.

- B. Format and Content: The breakdown values in the Schedule of Values must be true and accurate and consistent with actual project costs incurred. Use the 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/Engineer.
    - c. Architect/Engineer'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 and Division.
    - 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; and percentage of the Contract Sum to nearest one-hundredth percent adjusted to total 100 percent.
  - 3. Provide a breakdown of the Contract Sum in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with the Project Manual table of contents. Provide several line items for principal subcontract amounts, where appropriate.
  - 4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.
  - 5. Provide a separate line item in the Schedule of Values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed. Differentiate between items stored on-site and items stored off-site; see 1.4.C below.
  - 6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion such as delivery, installation, start up and commissioning total installed value of that part of the Work.
  - 7. Provide a line item in the schedule of values for Allowances. Use information indicated in the Contract Document and specification Section 01-2100 to determine quantities and/or amounts.



8. Each item in the Schedule of Values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
    - a. Major temporary facilities and other overhead cost items that are not a direct cost of actual work-in-place shall be shown as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option
  9. Each line item in the Schedule of Values must be broken down into two categories to comply with certain LEED credit requirements: These categories are:
    - a. Materials
    - b. Labor/Equipment
  10. The Schedule of Values shall contain line items for work associated with Sustainable Design Requirements to include:
    - a. Diverting a minimum of 95% by weight of the waste generated from site preparation and demolition activities as defined in Section 01 7419 and LEED credit MR2.2
    - b. Diverting a minimum of 95% by weight of the waste generated from construction activities as defined in Section 01 7419 and LEED credit MR2.2
    - c. Implementing the Construction Indoor Air Quality Plan as described in Section 01 8119 and LEED credit EQ3.1.
  11. Schedule Updating: Update the Schedule of Values before each Application for Payment when Change Orders and/or Contract Amendments result in a change in the Contract Sum. Field Orders do not change the Contract Sum and should not be listed in the Schedule of Values.
- C. Off-Site Storage: Payment **will not** be made for materials and equipment stored off the site, except at Owner's sole discretion and prior approval. In general, material stored out of the County will not be approved for payment. If the Owner allows off-site storage, the corresponding Application shall be accompanied by:
1. Statement describing and quantifying the item(s) and photographs of items being stored,
  2. Statement certifying location of the bonded warehouse(s) where materials or equipment is being stored,
  3. Signed Affidavit of Storage,
  4. Certificate of Insurance,
  5. Bill of Sale made to Owner and
  6. Statement certifying that item, or any part thereof, will not be installed in any construction other than work under this Contract.
  7. Any approved material stored offsite shall be made available for inspection by the Architect/Engineer or Owner prior to payment.

#### 1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect/Engineer and paid for by Owner. Initial Application for Payment, Application for Payment at time of Substantial Completion, Application for Retainage Payment and final Application for Payment involve additional requirements.
- B. Monthly Applications for Payment:
1. Payment Application Times: Unless noted otherwise, applications for payment shall be made monthly, near the end of each month. The period of construction work covered by each Application for Payment will usually be the preceding month. In order to expedite the review and approval of each application for payment, submit to and review with the Architect/Engineer and the Owner a draft (pencil copy) of each application for payment prior to submitting a formal copy.

2. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets (detailed generated from P6 WBS) as the forms for Applications for Payment. Equivalent forms will be considered at Contractor's request.
  3. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect/Engineer will return incomplete applications without action.
    - a. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions have been made.
    - b. Include amounts of Change Orders issued before the last day of construction period covered by application.
  4. Transmittal: Submit three (3) signed and notarized original copies of each Application for Payment to Architect/Engineer by a method ensuring receipt within 24 hours. Provide two (2) binders with tabbed sections for a Table of Contents and each of the following: required quality-control documentation and similar required documentation as proscribed in Section 01 4500 3.2.B.m.3 and 3.9.C; daily reports for the month; monthly, date-stamped progress photos; and material tickets for the materials stored on-site for the storm water management system.
  5. Waivers of Mechanic's Lien: Upon Owner request, submit waivers of mechanic's liens from subcontractors, sub-subcontractors, and suppliers for construction period covered by the previous application.
  6. Separate Monthly Payment Application Packet for Contract and Field Order work to be submitted at the same time.
  7. Contractor shall submit detailed report stating that all prior months' Prevailing Wage compliance issues identified by the County and its compliance monitor, CCMI have been resolved. County may withhold payment equivalent to outstanding Prevailing Wage issues from monthly progress payment, Substantial Completion, and/or Final Completion request.
- C. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors and suppliers.
  2. Approved Schedule of Values (Schedule of Values to be submitted to and approved by Architect/Engineer and Owner prior to submission of first application for payment.)
  3. Contractor's CPM Construction Schedule.
  4. Products list.
  5. Submittals Schedule (preliminary if not final).
  6. List of Contractor's staff assignments and principal consultants.
  7. Copies of trade permits, authorizations and licenses from authorities having jurisdiction for performance of the Work.

8. Initial progress report.
  8. Contractor's Quality Control Plan.
- D. Application for Payment at Substantial Completion: After receiving the Certificate of Substantial Completion executed by the Owner, submit an Application for Payment.
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 Certificates of Partial Substantial Completion, if any, issued previously for Owner occupancy of designated portions of the Work.
  3. 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.
  4. Contractor's request for partial release of retainage at Substantial Completion should be made separately from progress application for payment.
  5. Provide additional documents as prescribed in General Conditions of Construction Contract Article 14.2.
  6. Release/closeout of all permits, including Sediment Control, Public Right-of-Way and Parks.
  7. Submission of final, approved O&M Manuals.
  8. Submission of all required attic stock.
  9. Statement certifying completion of all required Commissioning.
  10. Submission of as-built drawings.
- E. Application for Retainage Payment:
1. Application requires approval by the Owner's Office of Procurement.
  2. Provide additional documents as stated in General Conditions of Construction Contract Article 13.2.5.
  3. Contractor's application for Retainage payment shall be made separately from all other application(s) for payment.
- F. Final Payment Application: 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 all Project closeout requirements including completion of all punchlist items.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. All required warranties, guarantees and bonds required by the contract.
  4. Updated final statement, accounting for final changes to the Contract Sum.
  5. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
  6. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
  7. AIA Document G707, "Consent of Surety to Final Payment."
  8. Evidence that any claims have been settled, and that the payment application represents full and final payment for all work under the Contract.
  9. Final liquidated damages settlement statement.
  10. Certificate of Final Completion
  11. Release/closeout of all Permits including the Sediment Control, Public Right-of-Way and Parks.
  12. Removal of all temporary facilities, utility service connections, surplus materials, rubbish and similar materials.

13. Certification from USGBC that all LEED credits that are scheduled to be earned during construction have been applied for and achieved. If not achieved provide documentation that Owner has accepted this revision to the LEED scorecard.
14. Additional documents and certifications as prescribed in General Conditions of Construction Contract Articles 14.3 and 14.4.

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

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

**END OF SECTION**

**SECTION 01 3100**  
**PROJECT MANAGEMENT AND COORDINATION**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General project coordination procedures.
  - 2. Coordination Drawings.
  - 3. Coordination of Space.
  - 4. Administrative and supervisory personnel.
  - 5. Project meetings.
  - 6. Requests for Information.
  - 7. Field Survey and Layout
- B. Related Sections: The following Sections contain requirements that relate to this Section:
  - 1. Division 1 Section "Construction Progress Documentation" for preparing and submitting the Contractor's Construction Schedule.
  - 2. Division 1 Section "Submittal Procedures" for submitting shop drawings.
  - 3. Division 1 Section "Closeout Procedures" for coordinating Contract closeout.
  - 4. Division 1 Section "Contractor Quality Control" for meetings to satisfy CQC Program.

**1.3 GENERAL COORDINATION**

- A. Coordinate procurement and construction operations included in various 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 construction operations by each subcontractor with those of other subcontractors and entities to ensure efficient and orderly installation of each part of the Work. The Contractor and each subcontractor shall coordinate its operations with operations included in different Sections that depend on each other for proper installation, connection and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components with other contractors to ensure maximum accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
- C. If necessary, prepare documentation for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
  - 1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.
- D. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Contractor's Construction Progress Schedule.

2. Preparation of the Schedule of Values.
  3. Preparation of Quality Control Program
  4. Installation and removal of temporary facilities and controls.
  5. Delivery and processing of submittals.
  6. Progress meetings.
  7. Pre-installation conferences.
  8. Project closeout activities.
- E. In ALL areas, except as otherwise indicated, conceal pipes, ducts, conduit and wiring within construction. Coordinate location of fixtures and outlets with finish elements. Bring unconcealed conditions indicated to the attention of the AE for confirmation of intent.
- F. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.
- G. As stated in section 01 1000 Summary, the Contractor shall be required to use the "Newforma Project Cloud" web based collaboration and construction management software system.
- H. The Contractor is required to provide three (3) work days' notice to Owner of any testing and/or inspection by any manufacturer's representative.

#### 1.4 ELECTRONIC DOCUMENT PROCESSING SERVICE

- A. To expedite the electronic review process, the contractor shall process all documents through a web-based software service.
1. See Section 01 1000 for selected service.
- B. Sending documents via email, FTP or paper will not be accepted except where paper copies are specifically required by Contract Documents, unless otherwise noted.
- C. An unlimited number of users can be added to the project at no additional cost.
- D. The web-based software shall provide status logs, reports, searching and automated notifications.
- E. The web-based software shall include at a minimum the following modules:
1. Submittals
  2. Submittal Register
  3. RFIs (Request for Information)
  4. Field Reports, including CQC and Daily Reports
  5. Pay Applications
  6. Storage for Construction Documents and Specifications
  7. Revision Documents (ASI, CCD, PR, PCO, COR, CO, etc)
  8. Meeting Minutes
  9. Gantt charts, reports, narratives and milestones
  10. Construction Progress Photographs and Videos
- F. The web-based software shall provide integrated web-based markup tools. All users shall be able to markup a centralized file to eliminate redundancy of files.
- G. The routing of the documents shall be automated, so the documents will automatically be sent to design team users based on trade or discipline.
- H. The web-based software company shall provide a minimum of two training sessions per project by web conference, if required.
- I. The web-based software shall include a downloadable offline archive of all project data.
- J. The web-based software shall provide tools for subcontractors to submit documents to contractor. Software must be capable of allowing contractor to review information before submitting to the design team and owner. It is at the contractor's discretion if the subcontractor submits documents through the web-based software.
- K. Color samples and other submittals requiring physical review shall be logged into the system and delivered by mail or courier.

## L. Selected Service:

1. Newforma Project Cloud
  - a. [www.newformaprojectcloud.com](http://www.newformaprojectcloud.com)
  - b. 800-303-4650
  - c. [mailto: projectcloud@newforma.com](mailto:projectcloud@newforma.com)

M. Cost: The County will pay Newforma for the cost to use this service for this project.

## 1.5 COORDINATION DRAWINGS.

## A. General:

1. Submit required coordination drawings to Architect/Engineer and Owner for record only and not review, to be submitted within 90 days of Notice-to-Proceed 1. Coordination drawings are not shop drawings. No additional compensation will be paid to correct work that does not fit in the space available, due to inadequate coordination by the Contractor, or that could have been resolved in the coordination drawing. Bring any discrepancies to the Architect/Engineer's attention for resolution at the time of submitting the coordination drawings. Three-dimensional modeling software to be used to prepare the coordination drawings.
2. Coordination drawings shall show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in space provided and/or to function as intended.
3. Except as otherwise specified, prepare composite coordination drawings to scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of utilities, architectural, structural, mechanical, plumbing, sprinkler and electrical elements, equipment and materials in relationship with each other. Include dimensions.
4. Provide coordination drawings utilizing different colors to illustrate work of separate trades or systems.
5. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to efficient flow of Work affecting one or more trades.
6. Indicate scheduling, sequencing, movement, and positioning of large equipment into building during construction.
7. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
8. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communications systems components, sprinklers, and other ceiling-mounted devices.
9. Show interrelationship of components to be shown on separate Shop Drawings.
10. Indicate required installation sequences.

## B. Site Utilities: The coordination drawings shall include, but not be limited to, the following site utilities:

1. Water Distribution: Indicate pipe sizes, valve and meter locations, underground structures, connections, anchors, and reaction backing. Indicate spatial relationship between piping and other piping in same trench, proximate structures, and other existing utilities and related structures.
2. Sanitary Sewerage: Indicate pipe sizes, manholes, locations and elevations, underground structures, and connections. Indicate spatial relationship between piping and other piping in same trench, proximate structures, and other existing utilities and related structures.
3. Natural Gas Distribution: Indicate pipe sizes, valves, gas meters, and specialties. Include details of underground structures and piping. Show other piping in same trench and clearances from natural gas piping. Indicate interface and spatial relationship between piping, proximate structures, and other existing utilities and related structures.
4. Electrical and Communications: Indicate manholes and other structures, conduit and ductbank sizes, locations, and elevations. Include details of underground structures and

- connections. Indicate spatial relationship between conduit and other piping in same trench, proximate structures, and other existing utilities and related structures.
5. Storm Drainage: Indicate pipe sizes, manholes and catch basins locations and elevations. Include details of underground structures and connections. Show other piping in the same trench and clearances from storm sewerage system piping. Indicate interface and spatial relationship between piping, proximate structures, and other existing utilities and related structures.
  6. Profile Drawings: Show system piping and conduits in elevation. Draw profiles at a horizontal scale of not less than 1 inch equals 50 feet and a vertical scale of not less than 1 inch equals 5 feet. Indicate pipe, conduit and underground structures. Show types, sizes, materials, and elevations of all crossing utilities on profile
- C. Structural Systems: Include, but do not necessarily limit to following:
1. Structural frame showing interface with exterior elements.
  2. Location of openings in relation to structure.
  3. Show attachments to decking, structural elements, and other systems.
- D. Above Ceiling Coordination:
1. Work by all above ceiling trades, especially work located by the Contractor (i.e. sprinkler pipes, conduit runs, etc.) must be carefully coordinated by the Contractor, prior to shop drawings submissions to assure that all work will fit in the space available.
  2. The Contractor shall prepare above ceiling coordination drawings for all ceilings and all other ceiling space within 90 days of Notice to Proceed (NTP-?). The drawings should show all above ceiling work, and structure, with required clearances and dimensions shown. The drawing should also show exposed ceiling work. Drawings must locate all ductwork, pipes, and conduit. In preparing these drawings, verify structural conditions, and requirements of all above ceiling trades. All above ceiling work and exposed ceiling work must be fully coordinated by the Contractor, prior to submitting shop drawings for affected items.
  3. Submit the coordination drawings to the Architect/Engineer and Owner for record but not review. No additional compensation will be paid to correct work that does not fit in the space available, due to inadequate coordination by the Contractor, or that could have been resolved in the coordination drawing. Bring any discrepancies to the Architect/Engineer's attention for resolution at the time of submitting the coordination drawings.
  4. The Contractor should hold a pre-installation meeting with all subcontractors involved in the above ceiling and exposed ceiling work. Review the coordination drawing requirements, plans, specifications, and proposed work sequencing and schedule. Resolve any problems or discrepancies prior to proceeding with the work. Contractor to invite, but not require, the Owner and the Architect/Engineer to this meeting.
- E. Mechanical Systems: Include, but do not necessarily limit to, following:
1. Proposed locations of piping, ductwork, equipment, and materials.
  2. Proposed locations for access panels and doors.
  3. Clearances for installing and maintaining insulation.
  4. Clearances for servicing and maintaining equipment, including coil removal, filter removal, and space for equipment disassembly required for periodic maintenance. Show access locations.
  5. Equipment connections and support details.
  6. Exterior wall and foundation penetrations.
  7. Fire-rated wall and floor penetrations.
  8. Sizes and location of required concrete pads and bases.
  9. Valve stem movement.



- F. Electrical Systems: Include, but do not necessarily limit to, following:
  - 1. Proposed locations of major raceway systems, equipment, and materials.
  - 2. Clearances for servicing equipment, including space for equipment disassembly required for periodic maintenance. Show access locations.
  - 3. Exterior wall and foundation penetrations.
  - 4. Fire-rated wall and floor penetrations.
  - 5. Equipment connections and support details.
  - 6. Sizes and location of required concrete pads and bases.
- G. Notify Architect of conflicts and other coordination issues requiring resolution prior to commencing construction in each affected area. Respond to Architect/Engineer's requests for information concerning the coordination drawings
- H. Transmit copies of final coordination to all interested parties including all concerned subcontractors. Keep a paper copy of all final coordination documents in the contractor's field office; make available for review and use by Architect/Engineer and Owner during construction.

#### 1.6 COORDINATION OF SPACE

- A. Coordinate use of ceiling space in accordance with the submitted ceiling coordination drawings.
- B. Coordinate use of Project space and sequence of installation of plumbing, fire protection, mechanical and electrical Work. Follow routings shown for pipes, ducts, and conduits as closely as practicable, with due allowance for available physical space; place runs parallel with building lines. Utilize space efficiency to maximize accessibility for other installations, maintenance, and repairs.
- C. Layouts of plumbing, fire protection, mechanical, and electrical systems, equipment, fixtures, piping, ductwork, conduit, specialty items, and accessories indicated on Drawings are diagrammatic. Contractor shall make minor variations in alignment, elevation, and details required to avoid interference and to satisfy architectural and structural limitations. These adjustments shall be made at no additional cost to the Owner.
- D. Prior to installation of material and equipment, review and coordinate Work with Architectural and Structural Drawings to establish exact space conditions. Where available space is inadequate or where reasonable modifications are not possible, request information from Architect/Engineer before proceeding.
- E. Coordinate installation to prevent conflicts and cooperate in making, without extra charge, reasonable modifications in layout as needed.
- F. Provide clear access to control points, valves, strainers, control devices, and specialty items of every nature related to such systems and equipment to obtain maximum head room. Provide adequate clearances as necessary for operation and maintenance.

#### 1.7 ADMINISTRATIVE AND SUPERVISORY PERSONNEL

- A. General: In addition to project manager, project superintendent and Quality Control manager, provide other administrative and supervisory personnel as required for proper performance of the Work. Within 10 days of Notice-to-Proceed 1 (NTP-1) , submit to Architect/Engineer and Owner a list of principal Contractor staff assignments, including superintendent, project manager, Quality Control manager and other supervisory personnel in attendance at Project site. Identify individuals and their duties and responsibilities; mailing addresses, office telephone numbers, cell telephone numbers, fax numbers, and email addresses. Provide names, addresses, telephone numbers, fax numbers, and email addresses of individuals assigned as standbys in the absence of individuals assigned to Project.
- B. Contractor is required to obtain Owner approval of each subcontractor prior to performing any work at site by that subcontractor.

- C. Contractor and subcontractors are required to enroll in County's wage compliance program and obtain approval of fringe benefits by County's Office of Business Relations and Compliance prior to performing any construction work on site.
- D. Post a copy of the wage compliance program and related information in the Contractor's Field Office.

## 1.8 PROJECT MEETINGS

- A. Pre-construction Conference: The Owner will schedule a pre-construction conference before starting construction, at a time convenient to Contractor, but no later than 10 days after Notice-to-Proceed 1 (NTP 1). The Architect/Engineer will preside at the meeting, record minutes of significant proceedings and decisions, and distribute minutes to participants within 7 days after the meeting. The minutes of this meeting will become part of the Contract Documents. The conference will be held at the Owner's office, the Project Site, or other convenient location. The meeting will be conducted to review responsibilities and personnel assignments.
  - 1. Attendees: Authorized representatives of Owner, Architect/Engineer, and their consultants; Contractor and its project manager, superintendent, and Quality Control Manager; major subcontractors; manufacturers; suppliers; and other concerned parties shall attend the conference. All participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 2. Agenda: Discuss items of significance that could affect progress, including but not limited to the following:
    - a. Designation of responsible personnel.
    - b. Procedures for Project correspondence and communications
    - c. Procedures for processing Requests for Information
    - d. Procedures for processing Changes to the Work.
    - e. Procedures for processing Applications for Payment.
    - f. Submittal procedures.
    - g. Initial construction schedule procedures for processing CPM Schedules and Updates
    - h. Critical work sequencing; long lead time items.
    - i. Contractor's Quality Control Plan
    - j. LEED requirements
    - k. Commissioning requirements
    - l. Use of the premises by Contractor and others.
    - m. Parking availability.
    - n. Working hours.
    - o. Project Phasing.
    - p. Temporary construction facilities and controls.
    - q. Temporary utilities
    - r. Schedule for progress meetings
    - s. Office, work, and storage areas.
    - t. Equipment deliveries and priorities.
    - u. Security.
    - v. Safety (including first aid)
    - w. Coordination with Testing and Inspection Agencies
    - x. Housekeeping (cleaning) procedures.
    - y. List of Subcontractors
    - z. Contract Completion and Closeout Requirements
    - aa. Procedures for Record Documents.
    - ab. Prevailing Wage Compliance Program
- B. Special Inspections Pre-construction Conference

1. In accordance with the Building Permit and the requirements of the County's Department of Permitting Services, a pre-construction conference(s) will be conducted by the County to review the procedures and work required under the Special Inspections Program.
  2. Suggested Agenda:
    - a. Discuss the County's requirements for Special Inspections.
    - b. Review proposed Inspection Plan.
    - c. Examine credentials of proposed inspection professionals and testing laboratories.
    - d. Reach an agreement on the Statement and the Schedule of Special Inspections.
    - e. Discuss detection and reporting of critical problems.
    - f. Discuss notification to the County of changes in critical services.
    - g. Review requirements for testing, inspection, observation, reports and certification by the different entities involved.
  3. Attendance: The following shall attend the pre-construction conference:
    - a. Architect.
    - b. Owner's Representative.
    - c. Structural Engineer of Record.
    - d. General Contractor, and any subcontractors required by the Owner.
    - e. Special Inspector
    - f. Professional in charge of Architectural Inspections.
    - g. Geotechnical Inspector; Professional in charge of Geotechnical Services.
    - h. Professional in charge of Structural Inspections (if different from Special Inspector)
    - i. Professional in charge of Materials Testing Laboratory (if different from Special Inspector).
    - j. County DPS Representative for Special Inspections
- C. Pre-installation Conferences: Schedule and conduct pre-installation conferences at the Project site before start of each construction activity that requires coordination with other construction.
1. Attendees: Following shall attend the meeting:
    - a. Contractor's Superintendent,
    - b. Contractor's Quality Control Manager (presides over meeting and is responsible for meeting minutes),
    - c. Owner's Construction Representative,
    - d. Installer (subcontractor),
    - e. Representatives from Testing Agencies
    - f. Representatives of manufacturers and fabricators involved in or affected by the activity,
    - g. Representatives of subcontractors that have preceded or will follow the activity or are otherwise affected by the activity, and
    - h. Others as appropriate to activity
    - i. Provide 48-hour (2 work days) written notice to the Architect/Engineer and the Owner Project Manager of all pre-installation conferences. They may attend as appropriate.
  2. Agenda: Review the progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents; requirements for proper installation.
    - b. Related Change Orders.
    - c. Purchases and deliveries
    - d. Approved Submittals including shop drawings, product data and quality-control samples
    - e. Review of mockups.
    - f. Possible conflicts and material compatibility problems.
    - g. Time schedules for activity, project schedule
    - h. Weather limitations.
    - i. Manufacturer's written recommendations.

- j. Warranty requirements.
  - k. Acceptability of substrates.
  - l. Temporary facilities and controls.
  - m. Space and access limitations.
  - n. Regulations of authorities having jurisdiction.
  - o. Testing and inspecting requirements including coordination with testing/inspection agencies.
  - p. Required performance results.
  - q. Documentation requirements.
  - r. Protection of construction, adjacent work, and personnel.
  - s. Required Environmental Conditions for work
  - t. Safety.
  - u. LEED and VOC requirements
3. Record significant conference discussions, agreements, and disagreements of each conference. Provide copy of record to everyone involved and Owner and Architect/Engineer
4. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- D. Progress Meetings: Architect/Engineer will conduct progress meetings at the Project Site **weekly**, unless otherwise directed. Days and times for meetings will be mutually agreed upon. Contractor shall provide site facilities for meetings. Agendas for each meeting will be developed.
- 1. Architect/Engineer will preside at progress meetings, record significant proceedings and decisions, and will distribute copies of meeting minutes to the Owner, Architect/Engineer, Design Consultants, and Contractor within 5 days after meeting. Contractor shall copy and distribute minutes to subcontractors, suppliers, and others as appropriate. Contractor will have the most current construction schedule displayed on the wall for each meeting.
  - 2. Attendees: In addition to representatives of the Owner, the Architect/Engineer, and the Contractor (including the Job Superintendent, Quality Control Manager and Project Manager), each subcontractor, supplier, or other entity concerned with current progress or involved in planning, coordination, or performance of near-future activities shall be represented at these meetings. When requested by the Owner, the Contractor's CPM Scheduler shall attend progress meetings. All participants at the conference shall be familiar with the Project and authorized to conclude matters relating to the Work.
  - 3. Agenda will generally include the following:
    - a. Review, edit and approve minutes of the previous progress meeting.
    - b. Review items of significance that could affect progress including any issues needing Owner and/or Architect/Engineer action to prevent delays.
    - c. Include topics for discussion as appropriate to the status of the Project.
    - d. Review Work progress, since the last meeting, compared against the latest approved and posted Construction Schedule. Determine status of each current and near-future activity on the schedule to determine whether it is on time, ahead of schedule, or behind schedule. Pay especial attention to Critical Path items. Include Procurement activities (including fabrication and delivery dates) in the review.
    - e. Corrective measures and procedures required to maintain Construction Schedule, if activities are behind schedule.
    - f. Work scheduled for succeeding construction period (usually two weeks)

- g. Field observations and problems with proposed solutions. Review Contract deficiencies with regards to quality, safety, manpower, supervision, etc. Include report by Quality Control Manager.
  - h. Status of Submittals (current log to be provided by Contractor).
  - i. Status of Proposed Changes to the Work (current log to be provided by Contractor)
  - j. Status of Requests for Information (current log to be provided by Contractor)
  - k. Review of CQC Issues/Deficiencies Log for status and progress
  - l. Review of preliminary payment requests (as appropriate).
  - m. Site Walk-through of the in-progress Work including site review of issues discussed during progress meeting. Walk-throughs shall be attended by, at a minimum: Contractor Superintendent, Contractor Project Manager, Architect/Engineer and Owner.
  - n. Status of Prevailing Wage reports
  - o. LEED status update. If necessary a separate monthly meeting re LEED and Sustainable Design will be held.
- E. Coordination Meetings: Within 60 days of NTP 1, Contractor will conduct a meeting with all the major subcontractors and project team to review any discrepancies in the contract documents. Any queries resulting from this meeting will be submitted to A/E as RFIs. Purpose of the meeting is to identify any issues/conflicts in Contract Documents and resolve it before it affects project progress.
- F. In addition, conduct Project coordination meetings for all parties (subcontractors, suppliers, etc.) involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as progress meetings and pre-installation conferences.
- 1. Attendees: Representation at each meeting by every party (Contractor, subcontractor, supplier, etc.) currently involved in construction activities. All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work
  - 2. Reporting: Record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.
- G. Construction Quality Control Meetings: Conduct and attend meetings required by Section 01 4500, Construction Quality Control.
- H. Commissioning Meetings: Conduct and/or attend meetings required by the Commissioning Plan and/or Commissioning Specification Sections.
- I. LEED/Sustainable Design meetings: Conduct meetings to review status of LEED preparation for USGC submittal.
- J. Special Meetings: Attend special meetings when requested by the Owner at Project Site or Owner's office to discuss specific project concerns. Attendees shall include Contractor project manager or Principal (as requested by the Owner) and any requested Subcontractor project manager or Principal (as requested by the Owner). All participants at the meetings shall be familiar with Project and authorized to conclude matters relating to the Work.

#### 1.9 REQUESTS FOR INFORMATION

- A. In the event that some portion of the Contract Documents requires clarification or interpretation by the Architect/Engineer, submit a written "Request for Information (RFI)" on a form approved by the Architect/Engineer. Requests for Information may only be submitted by the Contractor, not subcontractors, and shall be submitted to the Architect/Engineer and the Owner simultaneously. Contractor shall clearly and concisely set forth the issue for which clarification or interpretation is sought and why a response by the Architect/Engineer and/or Owner is needed; completely provide all required information on the RFI form. Indicate an interpretation or understanding of the Contract requirement and reasons why such an understanding has been reached.

- B. The Architect/Engineer will review all Requests for Information to determine whether they are requests for information within the meaning of the term. If Architect/Engineer determines that the document is not a Request for Information, the request will be returned to Contractor, un-reviewed as to content. Any Request for Information to which the Architect/Engineer's response is a readily available Contract Document reference must be noted as such in the RFI Log. A pattern of submitting such unnecessary RFIs may result in a claim by the Owner against the Contractor for delay of the Project.
- C. Responses from Architect/Engineer and/or Owner to RFIs do not change the requirements of the Contract Documents. If the Contractor believes that a response to a Request for Information represents a change in the requirements of the Contract Documents, the Contractor shall immediately indicate this by submitting written notice to Architect/Engineer and Owner per the requirements of the General Conditions. Failure to submit written notice immediately shall waive Contractor's right to seek additional time or cost under the General Conditions of the Contract.
- D. All submitted RFIs shall bear the signature of the Contractor.
- E. Contractor shall maintain a current log of all RFI requests and answers at the Contractor's Field Office; this log shall be tracked on the web-based project management software.

#### 1.10 FIELD SURVEY AND LAYOUT

- A. Within 30 days of Notice to Proceed 1 (NTP-1), Contractor shall provide all field engineering services required to lay out the Work.
- B. Contractor shall employ a land surveyor registered in the State of Maryland and experienced in providing the specified services, to establish elevations, lines and levels utilizing recognized engineering survey practices.
- C. Within 30 days of Notice to Proceed, Contractor shall engage the surveyor to verify existing survey information shown on the Contract Documents including the location and verification of structures, dimensions, elevations, property lines, and indicated permanent benchmarks, control points and reference points. If discrepancies are discovered, notify Architect/Engineer and Owner promptly and before proceeding with affected work.
- D. The surveyor shall also establish benchmarks, control points and reference points from which the facility elevations and lines can be determined for each element of the Work. Inform installers of lines and levels to which they must comply.
- E. Contractor shall protect and maintain all benchmarks, control points and reference points established by the surveyor. If survey control points are damaged, moved, or destroyed, engage surveyor to re-establish the control points.
- F. The existence and location of utilities and other construction indicated as existing are not guaranteed. Before beginning work, Contractor shall investigate and verify the existence (by performing test pits), location and elevations of all utilities and other existing construction. Verification of existing utilities must be performed within 60 days of commencement of project construction work. Notify Architect/Engineer and Owner immediately in writing of any discovered discrepancies before proceeding with affected work.
- G. During the progress of the Work, Contractor shall establish bench marks, reference lines, reference points and levels as necessary for each trade's work (including sitework) and for field verification of construction within specified tolerances. Check the location, level and plumb of every major element as the Work progresses; notify the Architect/Engineer when deviations from required lines and levels exceed allowable tolerances.
- H. Record Log: contractor shall maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect/Engineer or Owner.

- I. Upon completion of foundation work, Contractor shall submit two copies of a final building location survey, each copy certified by a State of Maryland licensed land surveyor, that indicate the location, elevation and dimensions of the buildings. At substantial completion, provide two copies of building and site improvements survey, each copy certified by a State of Maryland licensed land surveyor. Survey should verify that building and site improvements are accurately constructed in accordance with the Contract Documents. Certified surveys shall be submitted to the Owner and Architect/Engineer for record only, not for review and approval.

**PART 2 - PRODUCTS (NOT USED)****PART - EXECUTION (NOT USED)****END OF SECTION**





**SECTION 01 3200**  
**CONSTRUCTION PROGRESS DOCUMENTATION**

**PART 1 GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
1. Contractor's Progress Schedule.
  2. Schedule of Submittals.
  3. Daily construction reports.
  4. Material location reports.
  5. Field condition reports.
  6. Special reports.
  7. Construction photographs.
  8. Construction Video Camera.

**1.3 SUBMITTALS**

- A. **Construction Schedule:** Refer to Article 11 of the General Conditions of Construction Contract (GCCC).
1. Qualification Data: Within fifteen (15) days of Notice-to-Proceed 1 (NTP-1), submit, for Owner approval, Qualification Data for scheduling consultant specified in GCCC Article 11 to demonstrate capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other specified information.
  2. Contractor's Initial CPM Construction Schedule (ICPM): Within fifteen (15) days of Notice-to-Proceed 1 (NTP-1), Contractor shall submit printed copies, electronic copies, native file format and pdfs of initial CPM construction schedule in the following manner: one to Owner, one to Architect/Engineer and one to the Owners Construction Manager. Refer to additional ICPM/CPM submittal requirements located at the end of this section and GCCC Article 11. Printed copies shall be large enough, minimum of 24" x 36" to show entire schedule for entire construction period. Submit additional sets of initial construction schedule as necessary to obtain Owner and Architect/Engineer approval of initial schedule.
  3. CPM Construction Schedule Updates: As required by project conditions, but at least monthly, Contractor shall submit printed copies, electronic copies, native file format and pdfs of CPM construction schedule update in the following manner: one to Owner, one to Architect/Engineer and one to the Owners Construction Manager. Refer to additional ICPM/CPM submittal requirements located at the end of this section and GCCC Article 11. Printed copies shall be large enough, minimum of 24" x 36" to show entire schedule for entire construction period and provide separate copies of the critical path at the same size. Submit additional sets of construction schedule updates as necessary to obtain Owner and Architect/Engineer approval of update. Each update shall include changes to the last approved Schedule Update. Updates are required to be submitted prior to each contractor's requisition for payments; requisitions will not be processed without

corresponding schedule update. **Schedule updates shall be submitted at least monthly even if requisitions for payments are not submitted.**

4. Written narrative: Concurrent with each CPM schedule submission, Contractor shall submit printed copies and electronic copies, one native file format and one pdf of the CPM Written Narrative in the following manner: One to Owner, one to Architect/Engineer and one to Owners Construction Manager. The Narrative shall include a summary of changes to logic, duration, etc. since the preceding approved schedule. The Narrative shall also include copies of each computer-generated tabular report specified in GCCC Article 11.
- B. **Schedule of Submittals:** Within fifteen (15) days of Notice-to-Proceed 1 (NTP -1), submit an electronic copy, a native file format, a pdf and a paper copy of Schedule of Submittals to the Architect, the Owner and the Owners Construction Manager. One copy will be returned by the Architect/Engineer to the Contractor for the Contractor's administrative use
- C. **Daily Construction Reports:** Superintendent's and Quality Control Manager's daily reports shall be submitted to the Owner's Construction Representative contemporaneously (within a maximum of two working days).
- D. **Material Location Reports:** Submit three copies at monthly intervals, to be retained by the Architect.
- E. **Field Condition Reports:** Submit copies to the Architect, the Owner and the Owner's Construction Manager at time of discovery of differing conditions.
- F. **Special Reports:** Submit copies to the Architect, the Owner and the Owners Construction Manager at time of unusual event.

#### 1.4 COORDINATION

- A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.
- B. Coordinate Contractor's Construction Schedule with the Schedule of Values, list of subcontracts, Schedule of Submittals, progress reports, payment requests, and other required schedules and reports.
  1. Secure time commitments for performing critical elements of the Work from parties involved.
  2. Coordinate each construction activity in the network with other activities and schedule them in proper sequence.

### PART 2 PRODUCTS

#### 2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

- A. Refer to Article 11 of the General Conditions of Contract and Paragraph 1.3.
- B. Refer to additional ICPM/CPM requirements at the end of this section.
- C. The Schedule for this project shall be resource-loaded.
- D. The Schedule for this project shall be cost-loaded consistent with the schedule of values.

#### 2.2 SUBMITTALS SCHEDULE

- A. Article 11 of the General Conditions of Construction Contract requires that all Procurement activities, including the Schedule of Submittals, be incorporated into the Construction ICPM Schedule and subsequent CPM schedules. The following Schedule of Submittals shall be provided consistent with the information in the overall project schedule.
- B. Preparation: Submit a Schedule of Submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, resubmittal, ordering, manufacturing, fabrication, and delivery when establishing dates. Arrange the following information in a tabular format:

1. Scheduled date for first submittal.
  2. Specification Section number and title.
  3. Submittal category (action or informational).
  4. Name of subcontractor.
  5. Description of the Work covered.
  6. Scheduled date for Architect's final release or approval.
- C. Contractor must submit all required shop drawings, submittals, samples and mock-ups for approval to the A/E and/or regulatory agency within 120 days of issuance of NTP 2 regardless of when each item will be required or the work will be performed.
- D. Coordinate Schedule of Submittals with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
- E. Initial Submittal: 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.
- F. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

## 2.3 REPORTS

- A. Daily Construction Reports: Contractor Superintendent shall prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site. Provide the count of each subcontractor's personnel and the work (identified by Construction Schedule Activity Numbers as appropriate) being done by each subcontractor.
  2. List and count of General Contractor personnel at Project site. Identify the work (identified by Construction Schedule Activity Numbers as appropriate) being done by Contractor's forces.
  3. List of separate contractors at Project site. Include the count of each separate contractor's personnel and the work (identified by Construction Schedule Activity Numbers) being done by each subcontractor.
  4. Total Count of personnel at Project site.
  5. Visits by third parties including utilities, third-party inspectors, etc.
  6. Equipment at Project site (including hours equipment was utilized, idle and down for maintenance)
  7. Material deliveries.
  8. High and low temperatures and general weather conditions, including any weather events requiring stoppage or some or all of the Work
  9. Accidents.
  10. Meetings and significant decisions.
  11. Unusual events (refer to special reports).
  12. Stoppages, delays, shortages, and losses.
  13. Meter readings and similar recordings.
  14. Emergency procedures.
  15. Orders and requests of authorities having jurisdiction.
  16. Change Orders received and implemented.
  17. Written Modifications received and implemented.
  18. Services connected and disconnected.
  19. Equipment or system tests and startups.
  20. Substantial Completions authorized.
- B. Material Location Reports: At monthly intervals (consistent with the monthly requisition for payment), 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.

- C. Field Condition Reports: Immediately upon discovery of a difference between field conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Interpretation (RFI). Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

## 2.4 SPECIAL REPORTS

- A. General: Submit special reports directly to Owner within one day of an occurrence. Distribute copies of report to parties affected by the occurrence

## 2.5 CONSTRUCTION PHOTOGRAPHS

- A. Provide a comprehensive set of photographs, at monthly intervals, from commencement of Work until Final Completion of Project documenting the work performed during that month. Provide photographic services similar to those provided by Multivista (678) 691-1541 - located at 12003 Golf Ridge Court, #302, Fairfax VA 22033.
- B. Submit no less than twenty-four (24) photographs with the monthly requisition for payment, to the Owner and the Architect/Engineer. Photographs shall be submitted monthly even if a requisition for payment is not submitted for that month.
- C. Progression Sets to include
  1. 4 Sets of Regular Interior Progressions that captures each major wall to begin at time of substantial framing, with the final progression occurring at the finished condition of the interior, or as directed by the Owner.
  2. 12 Sets of Exterior Progressions - 360 degrees around the project to include all elevations and building envelope on monthly intervals or as directed by the Owner.
  3. Detailed Sets\*
    - a. Detailed Site-Survey Exact-Built™ (Pre-Construction) The pre-construction site survey provides coverage of the site and its immediate surrounding area to carefully memorialize pre-existing conditions before a project begins.
    - b. Detailed construction of caissons and foundations
    - c. Detailed Pre-Slab Exact-Built™ of the Slab on Grade ONLY. This will capture all critical infrastructure and systems inside the slab prior to the placement of concrete or as directed by the Owner.
    - d. Detailed Exterior Skin Exact-Built™: to capture the following items:
      - 1) Sub-grade waterproofing up to 5' below grade prior to backfill
      - 2) All wrapping of exterior of the building
      - 3) Window installation – to include flashing of the windows
      - 4) Roof - Includes overlapping photo of every square inch at waterproofing stage
    - e. Detailed Interior MEP Exact-Built™ of the entire building to include documentation of all mechanical, electrical and plumbing systems, to be conducted after rough-ins are complete, just prior to insulation and or drywall, or as directed by Owner. Includes all walls and ceilings.
    - f. Detailed Interior Final Exact-Built™ to be conducted just prior to certificate of occupancy or as directed by Owner. Includes all walls, ceilings and floors in their post-inspection, completed condition are documented in exceptional detail.
  4. Executive Summary Slideshows
    - a. To be provided during progression at monthly intervals and for the same durations as set forth above. Scope includes customizable sections for third party (i.e., Aerial Photographer) or Owner and Superintendent photograph collections. These will be dated and labeled per instruction of the respective party.
  5. Provide a pre-documentation meeting with the Owner to identify project specific need, appropriate documentation intervals and common and custom element requiring detailed photo sets to include the following:

- a. Baseline schedule analysis in order to evaluate and estimate appropriate photo set intervals and durations.
  - b. Determination of optimal photograph locations/perspectives ("hotspots") based on the site plans and building floor plans provided by the Owner or his agent(s) and designed to capture the total progress of construction at the agreed upon intervals and/or milestones.
  - c. A highly representative number of digital photographs at such intervals and for such durations, and at the specified milestones, as requested by the Owner and set forth in Section 1.1, above.
  - d. Linking each photo set to the appropriate location on the site plans and/or floor plans of the Owner.
  - e. On-line web hosting of the documentation on the Multivista website for the construction period covered by the documentation, accessible from anywhere internet is accessible.
  - f. Password protected access to the documentation.
6. Digital Images: Submit a complete set of digital image electronic files as a Project Record Document on CD-Rom, DVD or USB drive.
  7. Provide correct exposure and focus, high resolution and sharpness, maximum depth of field, and minimum distortion.
  8. Do not sell or display photographs in publications without permission of Owner.
  9. Prints: Provide color prints monthly:
    - a. Deliver one set of prints to Owner and one set to Architect.

2.6 Construction Video Camera:

1. Provide video cameras at a minimum of two locations, as shown on the Contract Drawings, to provide 24/7 coverage of site for construction activities to be available for view on the internet.
2. Owner to work with Contractor to make arrangements with building occupant where cameras are to be located, and provide location of internet connection to Contractor.
3. Key Plan: Submit key plan of project site and building with location of camera and range of camera to show coverage. If single camera is not able to provide total coverage, then additional cameras may be required.

## PART 3 EXECUTION

### 3.1 ICPM / CPM Submittal Guidelines

- A. ICPM and CPM must be prepared and submitted by the contractor (GC) in accordance with the contract documents and drawings of the RFP.
- B. Hierarchy of WBS and CPM schedule:
  1. L1 – Project
  2. L2 – Phase
  3. L3 – CSI Division
  4. L4 – CSI Section
  5. L5 - Drawing #, Utility Permit, Supplemental contract documents (amendment, addenda, ASI, FO, etc. not covered in the original specification or drawings)
  6. L6 - Activities (generated from each drawing page & CSI Section using criteria listed below)
- C. Activities – to generate minimum required activity list:
  1. For Each drawing item and CSI section add as a minimum one activity (or steps to an activity) to address the following categories:
    - a. Procurement:
      - 1) Submittals (shop drawings) by GC & subs

- 2) A/E (or owner) Review/Approval of submittals
      - 3) Fabrication
    - b. Installation/ construction activities
    - c. Quality control:
      - 1) Permit inspection
      - 2) QC/Commissioning (meetings, start-up, testing, training (owner), delivery of O&M Manuals)
  - 2. Utility – For each utility company, generate activities as required by utility permits or agreements
  - 3. Owner managed 3rd party activities shall be incorporated as per contract requirements (such as IT, security, asbestos, F&U)
  - 4. Post Substantial Completion (PSC) activities:
    - a. PSC punch list
    - b. PSC commissioning
    - c. Final Completion
  - 5. Milestones, shall include, but not limited to:
    - a. NTPs
    - b. Temporary living, sleeping and locker rooms in place
    - c. Completion of foundation system
    - d. Completion of Superstructure
    - e. Building Water Tight
    - f. Permanent Power
    - g. WSSC Water and Sewer Connection As-Built Drawing Submission
    - h. Permanent Water & Final Sewer Connection
    - i. Permanent Gas Services
    - j. Permanent Communication Services
    - k. Conditioned Building
    - l. Elevator Final Inspection
    - m. Closeout of Electrical Permit
    - n. Closeout of Mechanical Permit
    - o. Closeout of Plumbing Permit
    - p. Closeout of Fire Alarm Permit
    - q. Closeout of Fire Protection Permit
    - r. Closeout of Building Permit
    - s. Closeout of Right-of-Way Permit(s)
    - t. Obtained Use & Occupancy Permit
    - u. Finish work is complete
    - v. Site work is complete
    - w. Commissioning is complete
    - x. Operation and Maintenance Manual
    - y. Systems Training for Owner
    - z. Project Substantial Completion Certificate is issued
    - aa. Submission of Record Drawings (As-Built Drawings)
    - ab. Closeout of Sediment Control Permit
    - ac. Closeout of Park Permit
    - ad. Punch list work complete
    - ae. Final building completion
    - af. Pre-Installation meetings
    - ag. Existing Utilities Interruptions
- D. Assign Resources, Durations, Logic, & Constraints to activities:
- 1. Permit requirements (such as Sediment Control work sequence)
  - 2. Calendars (see detail below)

3. Limit activity duration to 10 working days for non procurement activities
  4. Provide 30 calendar days for A/E review (per Article 11.2.2)
  5. Substantial Completion (by phase) and other constraints specified in the contract
  6. Cost (use schedule of value (SOV)) per Article 11 of General Conditions and contract specification should be provided for all size/type of projects.
  7. Resource load per Article 11 of General Conditions.
  8. Set for EVM application with fixed cost based on SOV
- E. Calendars:
1. Calendar #1 – 7 days
  2. Calendar #2 – 5 days plus federal holidays
  3. Calendar #3 - 5 days plus federal holidays plus weather days (table in article 11.6.3 - weather impact of the general conditions)
- F. Activity Codes (per contract): As a minimum provide the following activity codes:
1. CSI,
  2. Schedule of Value (SOV) - for cost loading
  3. Responsibility (RESP) – GC, subs by trade, A/E, & Owner
  4. Phase
  5. Area/Location
- G. CPM Format (per contract - Article 11): Primavera P6 XER
- H. Reports:
1. Provide schedule reports per General Conditions Article 11.2 (WN, tabular, graphic, etc)
  2. Per all requirements specified in Division 1 specifications or other parts of the contract.

**END OF SECTION**





**SECTION 01 3300  
SUBMITTAL PROCEDURES**

**PART 1 GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and other Division 1 Specification Sections, apply to this Section.
- B. Refer to Article 9 of the General Conditions of Contract for additional submittal requirements.

**1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals required for performance of the Work. Contractor shall submit and receive final written Architect/Engineer approval for submittals required by the Contract Documents including as specified herein prior to proceeding with any work affected by the products, components or assemblies to be submitted.
- B. Related Sections include the following:
  - 1. Division 1 Sections "LEED REQUIREMENTS" and "LEED SUBMITTAL FORMS" for submittals requirements of LEED reporting.
  - 2. Division 1 Section "Payment Procedures" for submitting Applications for Payment and the Schedule of Values.
  - 3. Division 1 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes and for submitting Coordination Drawings.
  - 4. Division 1 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's Construction Schedule and the Submittals Schedule.
  - 5. Division 1 Section "Quality Requirements" for submitting test and inspection reports and for mockup requirements.
  - 6. Division 1 Section "Closeout Procedures" for submitting warranties, Record Documents and operation and maintenance manuals.
  - 7. Other Specification Sections for specific requirements for submittals in those Sections.
- C. **Contractor must submit all required shop drawings, submittals, samples and mock-ups for approval to the A/E and/or regulatory agency within 120 days of issuance of NTP-2 regardless of when each item will be required or the work will be performed.**

**1.3 DEFINITIONS**

- A. Action Submittals: Written and graphic information that requires Architect/Engineer's responsive action.
- B. Informational Submittals: Written and graphic information that does not require Architect/Engineer's responsive action. Submittals may be rejected for not complying with requirements.

**1.4 SUBMITTAL PROCEDURES**

- 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. 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 and/or color selection. Architect/Engineer reserves the right to withhold action

- on a submittal requiring coordination with other submittals until related submittals are received.
3. Do not submit any submittals for permit unless submittal has been approved by Architect/Engineer.
- B. Schedule of Submittals: Comply with requirements in Division 1 Section "Construction Progress Documentation".
- C. Processing Time: Make submittals promptly in accordance with construction schedules, and in such sequence as to cause no delay. Make submittals far enough in advance to allow enough time for Contractor and Architect/Engineer submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect/Engineer's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals (or resubmittals) enough in advance of the Work to permit processing.
1. Initial Review: Allow 30 days for initial review of each submittal by Architect/Engineer. Allow additional time if coordination with subsequent submittals is required. Architect/Engineer will advise Contractor when a submittal being processed must be delayed for coordination.
  2. Intermediate Review: If an intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow 30 days for review of each resubmittal.
  4. Concurrent Consultant Review: Where concurrent review of submittals by Architect/Engineer's consultants, Owner, or other parties is required, allow 30 days for each initial and 30 days for resubmittal review. Transmit submittals electronically thru Newforma as required in the following Sections simultaneously to the Architect/Engineer and the indicated Architect/Engineer's consultant. Final review comments on each submittal (and resubmittal) will be issued by the Architect/Engineer directly to Contractor thru Newforma.
    - a. Civil Engineer:
      - 1) All sections listed in Divisions 31 thru 33.
    - b. Structural Engineer:
      - 1) All Division 3 Sections.
      - 2) All Division 5 Sections.
    - c. Mechanical/Plumbing Engineer:
      - 1) All sections listed in Divisions 21 thru 23.
      - 2) All sections listed in Division 16.
    - d. Electrical Engineer:
      - 1) All sections listed in Divisions 26 thru 28.
    - e. Commissioning Authority:
      - 1) Commissioning Plan.
      - 2) All Commissioning Specification sections.
      - 3) All mechanical and electrical section designated by the commissioning agent upon review of the submittal schedule.
    - f. LEED Consultant:
      - 1) All sections where LEED requirements are identified.
- D. Identification: Place a permanent label or title block on each submittal for identification.
1. Indicate name of firm or entity that prepared each submittal on label or title block.
  2. Provide a space approximately 6 by 8 inches on label or beside title block to record Contractor's review, CQC review, and markings and action taken by Architect/Engineer.
  3. Include the following information on label for processing and recording action taken:
    - a. Project name.
    - b. Date.
    - c. Name and address of Architect/Engineer.
    - d. Name and address of Contractor.
    - e. Name and address of subcontractor.
    - f. Name and address of supplier.

- g. Name of manufacturer.
  - h. Submittal number and other unique identifier, including revision identifier.
    - 1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 06100.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 06100.01.A).
  - i. Number and title of appropriate Specification Section.
  - j. Drawing number and detail references, as appropriate.
  - k. Location(s) where product is to be installed, by drawing number as appropriate.
  - l. Other necessary identification.
- E. Submittals shall include information as necessary to indicate its compliance with Contract Documents, relationship to other work, and other information as specified, including:
- 1. Identification of product or materials
  - 2. Relation to adjacent structures or materials
  - 3. Field dimensions, clearly identified as such
  - 4. Applicable standards, such as ASTM number
  - 5. Clear identification of submittal material previously submitted and its status.
  - 6. Highlight Contract Document information in the Submittal.
- F. Deviations:
- 1. Encircle and specifically identify deviations from the Contract Documents on submittals.
  - 2. Substitutions and "or equal" products will not be processed through the submittal review process.
  - 3. Architect's Engineer's action on shop drawings cannot change the Work in the Contract Documents.
- G. Contractor Review: Contractor shall review and approve all submittals for compliance with Contract Documents and field dimensions prior to submission to Architect/Engineer. Contractor's approval shall be noted on the label or title block. The Architect/Engineer will return, un-reviewed, any submittal (or resubmittal) not bearing notation of the Contractor's approval.
- H. Copies: Unless noted otherwise, the number of copies to be submitted for each submittal shall be as follows:
- 1. Submittals shall be made and reviewed electronically thru the Newforma software.
  - 2. Provide 3 hard copies of all product samples and product colors to the Architect. Log these submittals into the Newforma system so they can be approved and tracked electronically.
  - 3. Submit one hard copy of all structural shop drawings directly to the structural engineer concurrently while posting them to the Newforma project site. These will not be returned. Comments will be incorporated electronically thru Newforma.
  - 4. Contractor shall print out a copy of all approved shop drawings from the Newforma site and keep them on site.
  - 5. Contractor shall print out copies of all approved shop drawings and submittals as needed to complete Operations and Maintenance manuals.
  - 6. For DGS Field Representative: Provide one complete full size paper copy of all approved submittals, shop drawings and all other project correspondence.
- I. Additional Copies at final submittal: Unless additional copies are required for final submittal, and unless Architect/Engineer observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal. Three clean final copies shall be provided for maintenance manuals without any marks noting the action taken.
- J. Transmittal: Package each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect/Engineer will return or discard submittals received from sources other than Contractor.
- 1. Transmittal Form: Use CSI Form 12.1A, AIA G810, or equal.

2. On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect/Engineer on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same label information as related submittal.
- K. Resubmittals: Make resubmittals in same form 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 including any changes which were other than those requested by Architect/Engineer.
  3. Resubmit submittals until they are marked "No Exceptions Taken", "Note Markings", or equivalent.
- L. Distribution: Reproduce and 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.
- M. Use for Construction: Use only final submittals with mark indicating "No Exceptions Taken", "Note Markings", or equivalent noted by Architect/Engineer.
- N. LEED Cover Sheets: copies of the LEED Submittal cover sheet shall be submitted with **all** Project submittals, without exception. The LEED IEQ Submittal cover sheet shall also be included for Adhesives and Sealants, Paint, Coatings, Carpet Systems, Composite Wood and Agrifiber Products. LEED Submittal sheet is included in these specifications.

#### 1.5 CONTRACTOR'S USE OF ARCHITECT/ENGINEER'S CAD FILES

- A. General: At Contractor's written request, copies of Architect/Engineer's CAD Drawing files will be provided to Contractor for Contractor's use in connection with Project, subject to the following conditions:
  1. The Contractor shall complete, sign and return to the Architect the CAD release form enclosed at the end of this section. The General Contractor shall then be responsible to transfer them on to their subcontractors.
  2. Allow one week for processing after receipt of the CAD release form. The files will be sent electronically thru a file transfer site.
  3. Architectural Floor Plans and Ceiling Plans only shall be made available for use as backgrounds for preparation of shop drawings. No other CAD Drawing files will be made available for this project.

## PART 2 PRODUCTS

### 2.1 ACTION SUBMITTALS

- A. General: Prepare and submit Action Submittals required by individual Specification Sections.
- 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 printed 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 written recommendations.
    - b. Manufacturer's product specifications.
    - c. Manufacturer's installation instructions.
    - d. Standard color charts.
    - e. Manufacturer's catalog cuts.
    - f. Wiring or piping diagrams showing factory-installed wiring or piping.
    - g. Printed performance curves.

- h. Operational range diagrams.
  - i. Mill reports.
  - j. Standard/specific product operation and maintenance manuals for the product(s) submitted for approval.
  - k. Compliance with specified referenced standards.
  - l. Test results by recognized testing agency.
  - m. Application of testing agency labels and seals.
  - n. Notation of coordination requirements.
  - o. Performance characteristics and capacities
  - p. Dimensions and clearances required.
  - q. LEED submittal and LEED IEQ cover sheet
- 4. Submit Product Data before or concurrent with Samples.
- 5. Number of Copies: See paragraph 1.4.H.
- C. Shop Drawings: Prepare project-specific information, drawn accurately to scale, on original drawings. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data. Shop drawings shall be prepared by qualifier detailer(s).
  - 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Dimensions.
    - b. Identification of products.
    - c. Fabrication and installation drawings.
    - d. Roughing-in and setting diagrams.
    - e. Wiring diagrams showing field-installed wiring, including power, signal, and control wiring.
    - f. Shopwork manufacturing instructions.
    - g. Templates and patterns.
    - h. Schedules.
    - i. Design calculations.
    - j. Compliance with specified standards.
    - k. Notation of coordination requirements.
    - l. Notation of dimensions established by field measurement.
    - m. Relationship to adjoining construction clearly indicated.
    - n. Seal and signature of professional engineer if specified.
    - o. Wiring Diagrams: Differentiate between manufacturer-installed and field-installed wiring.
    - p. Sustainable Design/LEED submittal and LEED IEQ cover sheet
  - 2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least 8-1/2 by 11 inches but no larger than 30 by 42 inches.
  - 3. Number of Copies: See paragraph 1.4.H.
- D. Samples: Submit Samples (physical examples) of materials, equipment or work 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. Submit full-sized fully fabricated Samples cured and finished as specified and physically identical with the proposed material or product. Submit Samples for actual dye lots or production runs as available.
  - 2. Samples shall include final treatments, such as "scotchguarding" or "fireproofing" where such treatments are a requirement on the actual product
  - 3. Submit Samples that contain multiple, related components such as accessories together in one submittal package.
  - 4. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample (including finish and composition)
    - b. Product name and name of manufacturer.

- c. Sample source.
  - d. Number and title of appropriate Specification Section
  - e. Location of intended use in the project.
5. Unless specified otherwise, submit full range of manufacturer's applicable standard colors, textures and patterns for review.
6. Size: Provide Samples of sufficient size to show:
  - a. All Salient features of the material or item, representative of the functional and aesthetic characteristics of the Product
  - b. The extremes of variation in color, texture, finish and construction to be expected in the installed work.
  - c. Functional characteristics of product or material, with integrally related parts and attachment devices.
7. Disposition: Maintain 2 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. One set to be held by the Owner.
  - a. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
8. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
  - a. Number of Samples: Submit 3 full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line.
9. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
  - a. Number of Samples: Submit three sets of Samples. Architect/Engineer will retain all samples.
    - 1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
    - 2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.
- E. Schedule of Submittals and Construction Photographs: Comply with requirements specified in Division 1 Section "Construction Progress Documentation."
- F. Application for Payment: Comply with requirements specified in Division 1 Section "Payment Procedures."
- G. Schedule of Values: Comply with requirements specified in Division 1 Section "Payment Procedures."
- H. Construction Quality Control Submittals: Comply with requirements specified in Division 1 Section(s) "Contractor Quality Control."
- I. Special Inspection Submittals: Submit all information required to comply with Montgomery County's Special Inspections requirements. Submittals may include, but are not limited to:
  1. Steel fabrication shop drawings
  2. Concrete mix design
  3. Formwork and shoring design
  4. Plan for removal and reshoring of formwork

5. Concrete quality control plan
  6. Contractor, subcontractor and supplier certifications
  7. Any other submissions as required by the Department of Permitting Services.
- J. Subcontractor 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. Update the list monthly to reflect new subcontractors. Use CSI Form 1.5A or approved equal. Include the following information in tabular form:
1. Name, address, and telephone number of entity performing subcontract or supplying products.
  2. Number and title of related Specification Section(s) covered by subcontract.
  3. Drawing number and detail references, as appropriate, covered by subcontract.
  4. Number of Copies: See paragraph 1.4.H.
- K. Sustainable Design and/or LEED Submittals: Provide required documentation requested to document LEED certification requirements; refer to Division 1 Section LEED Green Building Summary Requirements and the technical specifications.
- L. Pre-Construction Testing: Contractor must conduct all contract-required pre-construction testing as specified in Section 01 4000 Quality Requirements, and must submit data as part of the submittal approval request related to all such testing.

## 2.2 INFORMATIONAL SUBMITTALS

- A. General: Provide Informational Submittals required by other Specification Sections.
1. Number of Copies: Submit informational submittals to Architect/Engineer and Owner thru Newforma, unless otherwise indicated. See Paragraph 1.4H
  2. Certificates and Certifications: Provide a notarized 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.
  3. Test and Inspection Reports: Comply with requirements specified in Division 1 Section "Quality Requirements."
- B. Coordination Drawings: Comply with requirements specified in Division 1 Section "Project Management and Coordination."
- C. Qualification Data: Provide written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, names and addresses of Architect/Engineers and owners, and other information specified.
- D. Welding Certificates: Provide written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification (WPS) and Procedure Qualification Record (PQR) on AWS forms. Include names of firms and personnel certified.
- E. Installer Certificates: Provide 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.
- F. Manufacturer Certificates: Provide written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.
- G. Product Certificates: Provide written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- H. Material Certificates: Provide written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- I. Material Test Reports: Provide 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.

- J. Product Test Reports: Provide 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.
- K. Research/Evaluation Reports: Provide written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.
- L. Schedule of Tests and Inspections: Comply with requirements specified in Division 1 Section "Quality Requirements."
- M. Preconstruction Test Reports: Provide 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.
- N. Compatibility Test Reports: Provide 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.
- O. Field Test Reports: Provide reports written by a qualified testing agency, on testing agency's standard form, 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.
- P. Maintenance Data: Provide written and graphic instructions and procedures for operation and normal maintenance of products and equipment. Comply with requirements specified in Division 1 Section "Closeout Procedures."
- Q. Erection Drawings: Provide complete drawings indicating how components of the structure will be erected.
- R. Design Data: Provide 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.
- S. Manufacturer's Instructions: Provide written or published information that documents manufacturer's recommendations, guidelines, and procedures for storing, installing or operating a product or equipment. Include name of product and name, address, and telephone number of manufacturer. Include the following, as applicable:
  - 1. Preparation of substrates.
  - 2. Required substrate tolerances.
  - 3. Sequence of installation or erection.
  - 4. Required installation tolerances.
  - 5. Required adjustments.
  - 6. Recommendations for cleaning and protection.
- T. Manufacturer's Field Reports: Provide written information documenting factory-authorized service representative's tests and inspections. Include the following, as applicable:
  - 1. Name, address, and telephone number of factory-authorized service representative making report.
  - 2. Statement on condition of substrates and their acceptability for installation of product.



3. Statement that products at Project site comply with requirements.
  4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
  5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
  6. Statement whether conditions, products, and installation will affect warranty.
  7. Other required items indicated in individual Specification Sections.
- U. Insurance Certificates and Bonds: Provide written information indicating current status of insurance or bonding coverage. Include name of entity covered by insurance or bond, limits of coverage, amounts of deductibles, if any, and term of the coverage.
- V. Contractor's Key Personnel: Comply with requirements specified in Division 1 Section "Project Management and Coordination."

### 2.3 DELEGATED DESIGN

- 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/Engineer.
- B. Delegated-Design Submittal: In addition to Shop Drawings, Product Data, and other required submittals, submit three copies of a statement, signed and sealed by the responsible design professional, licensed in the State of Maryland, 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.

## PART 3 EXECUTION

### 3.1 CONTRACTOR'S REVIEW

- A. 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/Engineer. All submittals must bear the following certification, signed and dated by the Contractor, and by any subcontractor, sub-subcontractor or supplier who has prepared the submittal for the Contractor:
1. "I certify that the requirements of the Contract Documents have been met and all dimensions, conditions and quantities are verified as shown on the attached Submittal."
- B. 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 complying with General Conditions of Contract certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.
- C. Work that requires submittals shall not commence until complete compliance with submittal requirements have been met. Submittals are not considered complete until Contractor receives acceptable Architect/Engineer's written disposition on the submittal. Submittals noted to be resubmitted shall be resubmitted until all items requiring modification or clarification have been met and no resubmission is required as indicated on the Architect/Engineer's disposition on the submittal.

### 3.2 ARCHITECT/ENGINEER'S ACTION

- A. General: Contractor's responsibility for submitting true, accurate and complete submittals is not relieved by Architect/Engineer's review of and response to submittals. Architect's Engineer's action on shop drawings cannot change the Work in the Contract Documents.
- B. General: Architect/Engineer will not review submittals that do not bear Contractor's approval stamp and will return them without action.
- C. Color Selection: Architect/Engineer will select colors within 90 days of NTP-2 (to allow time for presentation to Owner and for Owner comments) after all color samples have been submitted for the items listed below. The submittal data shall be complete, including shop drawings, product data, and color samples, and all required submittals and materials shall be in compliance with the specifications and be subsequently approved by the Architect/Engineer. Color samples shall be actual samples of the material and not photographs. If there is a variation in color or lightness and darkness of the material, then two or more samples shall be submitted to show the range of variation.
  - 1. Exterior Items, including, but not limited to the following:
    - a. Cast stone.
    - b. Brick and HDMU.
    - c. Mortar.
    - d. Exposed joint sealants.
    - e. Roofing materials.
    - f. Exposed metal flashing and trim.
    - g. Metal Panels
    - h. Solid Phenolic Panels.
    - i. Aluminum entrances and storefronts.
    - j. Glass.
    - k. Glazed aluminum curtain wall.
    - l. Paint.
    - m. Louvers.
    - n. Signage.
  - 2. Interior Items, including, but not limited to the following:
    - a. Interior Architectural woodwork finishes.
    - b. Exposed joint sealants.
    - c. Wood door finishes.
    - d. Aluminum storefront and entrances.
    - e. Ceramic and porcelain tile.
    - f. Acoustical panel ceilings.
    - g. Sheet vinyl flooring
    - h. Resilient floor tile.
    - i. Resilient wall base.
    - j. Carpet Tile.
    - k. Paint.
    - l. Toilet partitions.
    - m. Signage.
    - n. Casework.
    - o. Floor mats.
    - p. Shades and Blinds
    - q. Specialty equipment
- D. Action Submittals:
  - 1. Architect/Engineer will review each required submittal for the limited purpose of checking for general conformance with the design concept as expressed in the Contract Documents.
  - 2. Architect/Engineer will review each submittal, make marks to indicate corrections or modifications required, and return it.

3. Architect/Engineer's action on a specific item shall not indicate approval of an assembly of which the item is a component.
4. Architect/Engineer will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action taken, as follows:
  - a. Submittals Marked "**No Exceptions Taken**": The Work covered by the submittal is "accepted as specified" and the Work may proceed provided it complies with requirements of the reviewed submittal and the Contract Documents.
  - b. Submittals Marked "**Note Markings**" or "**Make Corrections as Noted**": The Work covered by the submittal is "accepted as noted" and the Work may proceed provided it complies with Architect/Engineer's notations or corrections on the submittal and requirements of the Contract Documents. Resubmittal is not required unless Contractor cannot comply with noted changes; in which case, the Contractor shall resubmit for approval.
  - c. Submittals Marked "**Revise and Resubmit**": Do not proceed with the Work covered by the submittal. Revise or prepare a new submittal according to the Architect/Engineer's notations and requirements of the Contract Documents, and resubmit without delay. Unmarked items may be fabricated only if indicated.
  - d. Submittals Marked "**Resubmit properly**": Submittal was not reviewed because it did not contain the Contractor's signed approval prior to submission and/or because the submittal is not in adequate condition for review. Contractor must resubmit.
  - e. Submittals Marked "**Rejected**": Architect/Engineer will list reasons for rejection on the submittal or in the transmittal letter accompanying the submittal. Do not proceed with the Work covered by the submittal. Prepare new submittal according to the notations and requirements of the Contract Documents, and resubmit without delay.
  - f. Submittals Marked "**Not Reviewed**": Submittal is not required by Contract Documents; Architect/Engineer will not review.
5. Structural Calculations: Submittal of calculations for permanent or temporary construction structural components will be reviewed by the Architect/Engineer only for compliance with stipulated design criteria. The Architect/Engineer's review and/or any comments do not constitute any liability for the actual design of the structure.
- E. Informational Submittals: Architect/Engineer will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect/Engineer will forward each submittal to appropriate party.
- F. Partial submittals are not acceptable, will be considered nonresponsive, and will be returned without review.
- G. Submit required LEED submittal information concurrent with each product data and shop drawing submittal.
- H. System Manual and Operation and Maintenance Manuals: Within 60 days after receiving approved submittals; submit copy to be placed in the System and O&M manual. Submit copies of the installation, operation, repair and maintenance manuals for all systems.

**END OF SECTION**



**SECTION 01 3517**  
**LEED SUBMITTAL FORM**

**1.1 LEED SUBMITTAL FORM**

Instructions:

1. Contractor shall include this form with EVERY submittal as required by the specifications.
2. For each item checked below, Contractor shall include supporting documentation. See supporting documentation types below.
3. It is mandatory that the Contractor provide material cost as described below.

A. Is this submittal contributing to the LEED Credits required to achieve Silver rating or above?

YES \_\_\_\_\_ NO \_\_\_\_\_

If YES, continue to complete the remainder of the Submittal Form.

B. Material Costs:

1. Complete the following:
  - a. In accordance with Specification Section \_\_\_\_\_ we are providing \_\_\_\_\_ (name of material).
  - b. Cost of materials, including taxes and delivery costs incurred by the Contractor, excluding installation labor \$ \_\_\_\_\_.

C. Check the applicable LEED Credits below:

- \_\_\_ MR Credit 4 - Recycled Content.
- \_\_\_ MR Credit 5 - Regional Materials.
- \_\_\_ MR Credit 7 - Certified Wood.
- \_\_\_ EQ Credit 4.1 - Adhesives & Sealants.
- \_\_\_ EQ Credit 4.2 - Paints and Coatings.
- \_\_\_ EQ Credit 4.3 - Flooring Systems.
- \_\_\_ EQ Credit 4.4 - Composite Wood and Agrifiber Products.

**1.2 MR Credit 4 - Recycled Content, complete both:**

Pre - Consumer Recycled Content % \_\_\_\_\_.

Post - Consumer Recycled Content % \_\_\_\_\_.

**1.3 MR Credits 5 - Regional Materials:**

A. \_\_\_ Check here to indicate the final manufacturing of the referenced material/product is within 500 miles of the Project Site.

Manufacturer: \_\_\_\_\_.

Address: \_\_\_\_\_.

Miles from Project: \_\_\_\_\_.

B. \_\_\_ Check here to indicate that raw material(s) for this project are extracted or harvested within 500 miles of the Project Site.

\_\_\_ % (by cost) of raw materials used to manufacture this material/product that were extracted/harvested or recovered within 500 miles of the Project Site.

Raw Material Name/Description: \_\_\_\_\_.

Raw Material Supplier: \_\_\_\_\_.

Extraction or Harvest Site of Raw Materials: \_\_\_\_\_.

Miles From Project: \_\_\_\_\_.

## 1.4 MR Credit 7 - Certified Wood:

\_\_\_\_\_ % of this material/product is composed of FSC Certified Wood.

\_\_\_\_\_ % of this materials/ product is composed of new wood.

Description of FSC Material/Component: \_\_\_\_\_.

Describe the source of the FSC Certified Wood: \_\_\_\_\_.

Vendor COC Number: \_\_\_\_\_.

FSC Certification Attached: Yes \_\_\_\_\_ or No \_\_\_\_\_.

\_\_\_\_ Check here to indicate that invoice for this product and all other wood products will be submitted to the General Contractor.

## 1.5 EQ Credits 4.1 and 4.2 - Low Emitted Material (Adhesives, Sealants, Paints, Coatings):

\_\_\_\_\_ g/l of VOC contained in submitted product \_\_\_\_\_ g/l allowed.

## 1.6 EQ Credit 4.3 - Flooring Systems:

\_\_\_\_ Carpets meet Carpet and Rug Institute (CRI) Green Label Plus Standard.

\_\_\_\_ Carpet cushion is used, and meets Carpet and Rug Institute (CRI) Green Label Standard.

\_\_\_\_ Hard Flooring is certified as compliant with FloorScore Standard.

\_\_\_\_ Carpet or Flooring adhesives are used, and their VOC content is \_\_\_\_\_ g/l.

\_\_\_\_ Sealants or Sealant Primers are used, and their VOC content is \_\_\_\_\_ g/l.

\_\_\_\_ Floor Coatings are used, and meet SCAQMD Rule 13. VOC content is \_\_\_\_\_ g/l.

\_\_\_\_ Resilient Base & Accessories are certified as compliant with FloorScore Standard.

## 1.7 EQ Credit 4.4 - Composite Wood &amp; Agrifiber Products:

\_\_\_\_ Check here to indicate that all composite woods used on the interior are free of urea-formaldehyde.

\_\_\_\_ Check here to indicate that all laminating adhesives (shop and field-applied) are free of urea-formaldehyde.

## 1.8 SUPPORTING DOCUMENTATION - Check those documents attached:

\_\_\_\_ MSDS Sheet.

\_\_\_\_ Manufacturer's Cut Sheet.

\_\_\_\_ Manufacturer's Statement.

\_\_\_\_ Industry Statement.

\_\_\_\_ Other Verification.

## 1.9 COMPANY/MANUFACTURER: \_\_\_\_\_ Phone \_\_\_\_\_

Print Name: \_\_\_\_\_

Signature: \_\_\_\_\_

Title: \_\_\_\_\_ Date: \_\_\_\_\_

**END OF SECTION**

**SECTION 01 3523**  
**CONTRACTOR'S SAFETY REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 INTRODUCTION AND OBJECTIVES**

- A. The Contractor must ensure the safety of all persons at and adjacent to the Project Site, the Work, and other property at or adjacent to the Site. The Contractor also must ensure that all persons working on the Project Site are aware of the Contractor's responsibility in ensuring safe working conditions.
- B. The Contractor is responsible for complying with all construction safety laws, regulations, codes and standards or any other laws governing safety matters including, but not limited to, Occupational Safety & Health Administration (OSHA), Maryland Occupational Safety and Health (MOSH), ANSI/ASSE, NFPA, NEC, AWS, and IEC regulations, and Manufacturer's Safety Instructions or Recommendations. The Contractor must take all prudent steps to ensure that the Contractor, and every Subcontractor or Sub-subcontractor, does not allow or require any worker employed in the performance of the Contract to work in surroundings or under working conditions which are unsanitary, hazardous, or dangerous to his/her health or safety.
- C. The Contractor must be familiar with all current safety and health laws, regulations, codes and standards or any other laws pertaining to the Work and must follow and enforce such legal requirements. The Contractor must take all prudent steps to ensure that every Subcontractor or Sub-subcontractor is familiar with all current safety and health laws, regulations, codes and standards or any other laws pertaining to its portion of the Work and follows and enforces such legal requirements. The Contractor must keep at the Site at all times, and have available, copies of all relevant construction safety and health laws, regulations, codes and standards.
- D. The Contractor must provide the safety training and direction required to handle the specific safety requirements particular to the Work. The Contractor must instruct its site personnel, and must ensure that every Subcontractor or Sub-subcontractor instructs its site personnel in the recognition and avoidance of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury.

**1.2 SCOPE, RELATED DOCUMENTS, AND SAFETY LAWS**

- A. The Contractor's safety requirements include those requirements set forth in this section, and in the Contract Documents, as well as those requirements imposed by OSHA, MOSH, and all other applicable safety laws, regulations, codes and standards (collectively referred to as the "Contractor's Safety Requirements").
- B. In the event of any conflict between this section and any safety laws, regulations, codes and standards including, but not limited to, OSHA and MOSH requirements, the stricter requirement shall apply. However, in all cases, the Contractor's full compliance with all applicable safety laws, regulations, codes and standards including, but not limited to, OSHA and MOSH requirements is required.
- C. The Contractor is responsible for initiating, maintaining, and supervising all safety precautions in connection with the performance of the Contract. Neither the Owner nor the Architect/Engineer have control over, or charge of, or are responsible for construction means, methods, techniques, sequences or procedures, or for safety precautions and programs in connection with the Work, since these are solely the Contractor's responsibility as provided in the Contract Documents.

**1.3 SPECIFIC CONTRACTOR SAFETY RESPONSIBILITIES**

- A. The Contractor must plan for the overall safety and health on the Project. As part of the planning process, the Contractor must develop a Project-specific Safety Plan. The Contractor must establish regular safety and health planning meetings with all Subcontractors and Sub-

subcontractors for the purpose of coordinating Project activities. The Contractor must ensure that all persons at the Project Site are adequately trained and competent to carry out the work assigned to them. The Contractor must ensure that all persons at the Project Site are aware of any known hazards likely to occur in the course of the Work and to ensure that they are instructed in the safety procedures to be followed to avoid these hazards. All workers must receive a safety orientation (Reference ANSI/ASSE A10.1).

1. General Safety and Health Provisions (CFR 29 OSHA 1926.20)

- a. The Contractor must designate a Safety Supervisor (also known as a Safety Officer) with minimum 30 hours of OSHA construction outreach certified safety training. The Safety Supervisor must control and ensure safety on the project site, and maintain documentation of the safety program including all record keeping and reporting. The Safety Supervisor must also be trained on how to manage safety on the construction site including how to give a toolbox talk and how to respond to, investigate, and report an accident.
- b. The Project Site must be secured and protected. Only authorized personnel must be allowed on Site. The Contractor must ensure that the Site is kept clean and safe daily. All adjacent properties to the Project Site must be protected. All visitors to the Project Site must wear appropriate protective clothing including work boots, safety vests and hard hats.
- c. The Contractor must ensure that each employee of the Contractor or any Subcontractor or Sub-subcontractor at the Project Site is trained: in the recognition and avoidance of unsafe conditions, and regarding the regulations applicable to his/her work environment to control or eliminate any hazards or other exposure to illness or injury.
- d. The Contractor must post the name, telephone number, and address of the Safety Supervisor for the Site at prominent and visible locations.
- e. The Contractor must ensure that each employee of the Contractor or any Subcontractor or Sub-subcontractor at the Project Site is trained to immediately notify the Safety Supervisor in the event of an emergency or unsafe site condition. In case of a critical injury or a fatality, the Safety Supervisor must immediately call 911 and then notify MOSH, the Owner's On-site Representative, and County Project Manager within one hour of the incident.
- f. The Contractor must provide adequate containers for the collection and separation of waste, trash, oily rags, used rags, and other refuse. Containers used for garbage and other oily, flammable, or hazardous wastes, such as caustics, acids, harmful dusts, etc. must be equipped with covers. Garbage and other waste must be disposed of at frequent and regular intervals.
- g. The Contractor must be responsible for the removal of all waste from the Project Site. Waste must be collected in suitable containers. The Contractor must notify the Owner of any unanticipated hazardous wastes encountered at the Project Site; all hazardous wastes must be appropriately disposed of by the Contractor in accordance with all governing regulations including but not limited to Maryland Department of Environment (MDE) and Montgomery County Department of Environmental Protection (DEP) regulations.

2. Occupational Health and Environmental Controls (CFR 29 OSHA 1926.51)

- a. The Contractor must ensure that plans are codified in the Project-specific Safety Plan, prior to commencement of the Project, for prompt medical attention in case of serious injury. If an infirmary, clinic, hospital, or physician is not reasonably accessible in terms of time and distance to the Site for the treatment of injured employees, the Contractor must ensure the Site presence of a person with a valid certificate in first-aid training from the American Red Cross, or equivalent training that can be verified by documentary evidence, to render first aid. First aid supplies must be easily accessible when required.
- b. The Contractor must ensure that protection against excessive noise exposure is provided when the Site sound levels exceed those shown in Table D-2 of Part D, CFR 29 OSHA 1926 for construction when measured on the A-scale of a standard sound level meter at slow response. Where possible, noise must be controlled at the source



- through the use of engineering controls to minimize the need for personal protective equipment (Reference: ANSI/ASSE A10.46).
- c. The Contractor must ensure that site personnel are not exposed to inhalation, ingestion, skin absorption, or contact with any material or substance at a concentration above those specified in the current edition of "Threshold Limit Values of Airborne Contaminants" of the American Conference of Governmental Industrial Hygienists.
  - d. The Contractor must ensure that construction areas, ramps, runways, corridors, offices, shops, and storage areas are lighted to not less than the minimum illumination intensities listed in Table D-3 of Part D, CFR 29 OSHA 1926 for Construction while any work is in progress.
  - e. The Contractor must ensure that, whenever hazardous substances such as dusts, fumes, mists, vapors, or gases exist or are produced in the course of the Work, their concentrations do not exceed the limits specified in Part D, CFR 29 OSHA 1926.55(a).
  - f. For compliance with the airborne toxin limits as described above; the Contractor must implement administrative or engineering controls first whenever possible. (Part D, CFR 29 OSHA 1926.55(b)). If administrative or engineering controls cannot adequately reduce exposures, the Contractor must use respirators in compliance with a full respiratory protection program. The respiratory protection program administrator must be designated and is responsible for the implementation of the program. (29 CFR 1926.55(b) and .103 (referencing 1910.134)).
  - g. When ventilation is used as an engineering control method, the Contractor must install and operate the system according to the requirements of CFR 29 OSHA 1926 for Construction, mechanical codes, and any other applicable law, regulation, code or standard.
  - h. When local exhaust ventilation is used, the Contractor must design the ventilation to prevent dispersion into the air of dusts, fumes, mists, vapors, and gases in concentrations causing harmful exposure. Such exhaust systems must be so designed that dusts, fumes, mists, vapors, or gases are not drawn through the work area of persons at the Project Site.
3. Personal Protective & Life Safety Equipment (CFR 29 OSHA 1926.95)
    - a. The Contractor must ensure that all persons at the Project Site wear appropriate clothing and personal protective equipment (PPE) for the type of work being performed. The Contractor must ensure all persons at the Project Site are trained in the appropriate wear, use and maintenance of their PPE. The Contractor must ensure that no alcoholic beverages, narcotics or other dangerous drugs are used or allowed on the Project Site and must ensure that no smoking is permitted in any building(s), including the building(s) under construction. The Contractor must post NO SMOKING signs at appropriate locations to enforce this requirement.
    - b. The Contractor must provide, use, and maintain in a sanitary and reliable condition protective equipment, including personal protective equipment for eyes, face, head, and extremities, protective clothing, respiratory devices, and protective shields and barriers, wherever it is necessary by reason of hazards of processes or environment, chemical hazards, radiological hazards, or mechanical irritants encountered in a manner capable of causing injury or impairment in the function of any part of the body through absorption, inhalation or physical contact.
    - c. Where employees provide their own protective equipment, the Contractor must ensure its adequacy including proper maintenance, and sanitation of such equipment.
  4. Fire Protection and Prevention (CFR 29 OSHA 1926.150)
    - a. The Contractor must develop a fire protection program to be followed throughout all phases of the Work. The Contractor must provide for firefighting equipment as required by any work hazard and, as any fire hazard occurs, there must be no delay in providing the necessary equipment. Access to all available firefighting equipment must be maintained at all times.
    - b. The Contractor must install electrical wiring and equipment for light, heat, or power purposes in compliance with the requirements of the Contract.

- c. Internal combustion engine powered equipment must be so located that the exhausts are well away from combustible materials. When the exhausts are piped to outside the building under construction, a clearance of at least 6 inches must be maintained between such piping and combustible material
  - d. The Contractor must ensure that appropriate fire prevention measures are taken while working at the Project Site. The Contractor must take all necessary precautions to prevent accidental activation of fire alarms. Combustible material must not be placed near heaters. Welding and cutting are only permitted within easy reach of a suitably rated and charged fire extinguisher. Care must be taken to prevent sparks from falling on combustible material, workers or others near the site. Smoking is prohibited in all buildings, including buildings under construction and portable site offices. The Contractor must ensure that matches and smoking materials are properly extinguished when smoking in designated areas.
  - e. Smoking must be prohibited at or in the vicinity of operations which constitute a fire hazard, and must be conspicuously posted: "No Smoking or Open Flame."
- 5. Signs, Signals and Barricades (CFR 29 OSHA 1926.200)
  - a. Signs and symbols required by applicable safety laws, regulations, codes and standards must be visible at all times when work is being performed, and must be removed or covered promptly when the hazards no longer exist.
  - b. The Contractor must provide traffic control on the Site and its vicinity according to OSHA/MOSH requirements and the Contract Documents. All traffic control signs or devices used for protection of construction workers must conform to Part VI of the Manual of Uniform Traffic Control Devices (AMUTCD). For traffic control, Class 2 high visibility clothing must be worn on the Site, particularly for road work, Class 3 clothing must be worn at night. The Contractor must designate a safe parking location on or off the Site.
- 6. Materials Handling and Storage, Use and Disposal (CFR 29 OSHA 1926.250)
  - a. All materials stored in tiers must be stacked, racked, blocked, interlocked, or otherwise secured to prevent sliding, falling or collapse. Maximum safe load limits of floors within buildings and structures, in pounds per square foot, must be conspicuously posted in all storage areas, except for floor or slab on grade. Maximum safe loads must not be exceeded. Aisles and passageways must be kept clear to provide for the free and safe movement of material handling equipment or employees. Such areas must be kept in good repair. Reference ANSI/ASSE A10.46
  - b. All materials, whether temporary or permanent, must be suitable for its intended use and must be stored and installed in strict conformance with the manufacturer's instructions. Material Safety Data Sheets (MSDS) must be available on site.
  - c. The Contractor must ensure that all equipment is in good working condition, properly maintained and certified if required by regulations. Only trained and certified personnel must be allowed to operate equipment.
- 7. Tools - Hand and Power (CFR 29 OSHA 1926.300)
  - a. The Contractor must ensure that all hand and power tools and similar equipment, whether furnished by the employer or the employee, are maintained in a safe condition.
  - b. When power operated tools are designed to accommodate guards, they must be equipped with such guards when in use. Belts, gears, shafts, pulleys, sprockets, spindles, drums, fly wheels, chains, or other reciprocating, rotating or moving parts of equipment must be guarded if such parts are exposed to contact by employees or otherwise create a hazard. Guarding must meet the requirements as set forth in American National Standards Institute B15.1-1953 (R1958), Safety Code for Mechanical Power-Transmission Apparatus.
- 8. Welding and Cutting (CFR 29 OSHA 1926.352)
  - a. All welding, cutting activities, materials and equipment must conform to ANSI Z 49.1 Standard and MOSH and OSHA requirements
  - b. The Contractor must ensure that their workers and employees use the required specialized personal protective equipment required when working with welding or cutting

- equipment. The Contractor must also ensure that welding curtains are used where possible to protect other persons and property near the Project Site from welding arcs and flash. Hot work permit(s) must be used and enforced.
- c. When practical, objects to be welded, cut, or heated must be moved to a designated safe location or, if the objects to be welded, cut, or heated cannot be readily moved, all movable fire hazards in the vicinity must be taken to a safe place, or otherwise protected. If the object to be welded, cut, or heated cannot be moved and if all the fire hazards cannot be removed, positive means must be taken to confine the heat, sparks, and slag, and to protect the immovable fire hazards from them.
  - d. Suitable fire extinguishing equipment must be immediately available in the work area and must be maintained in a state of readiness for instant use.
  - e. All combustible or flammable materials within 50 feet of the site which can neither be hosed down with water nor moved away from the area must be protected by a covering of non-combustible material at all times during the operations.
9. Electrical (CFR 29 OSHA 1926.402)
- a. All electrical activities, materials and equipment must conform to all safety requirements including but not limited to NEC, IEC, NFPA 101, MOSH and OSHA requirements.
  - b. NOTE: If the electrical installation is made in accordance with the National Electrical Code ANSI/NFPA 70, exclusive of Formal Interpretations and Tentative Interim Amendments, it will be deemed to be in compliance with OSHA 1926 - for the purposes of this Specification Section only.
  - c. Reference CFR 1926, Subparts V - Power Transmission and Distribution, CC - Cranes and Derrick in Construction, for requirement regarding possible contact with live circuits in equipment and overhead.
10. Scaffolds (CFR 29 OSHA 1926.451)
- a. The Contractor must ensure that each scaffold and scaffold component is capable of supporting, without failure, its own weight and at least 4 times the maximum intended load to be applied or transmitted to it.
  - b. Direct connections to roofs and floors, and counterweights used to balance adjustable suspension scaffolds, must be capable of resisting at least 4 times the tipping moment imposed by the scaffold operating at the rated load of the hoist, or 1.5 (minimum) times the tipping moment imposed by the scaffold operating at the stall load of the hoist, whichever is greater.
  - c. Each suspension rope, including connecting hardware, used on non-adjustable suspension scaffolds must be capable of supporting, without failure, at least 6 times the maximum intended load applied or transmitted to that rope.
  - d. Aerial lifts must be designed and constructed in conformance with the applicable requirements of the American National Standards for "Vehicle Mounted Elevating and Rotating Work Platforms," ANSI A92.2-current edition, including appendix. Aerial lifts include the following types of vehicle-mounted aerial devices used to elevate personnel to job-sites above ground: Extensible boom platforms; Aerial ladders; Articulating boom platforms; Vertical towers. Lift controls must be tested each day prior to use to determine that such controls are in safe working condition. Only authorized persons shall operate an aerial lift.
  - e. The Contractor must ensure that each employee who performs work while on a scaffold is trained by a person qualified in the subject matter to recognize the hazards associated with the type of scaffold being used and to understand the procedures to control or minimize those hazards. The training must include the following areas, as applicable: the nature of any electrical hazards, fall hazards and falling object hazards in the work area; the correct procedures for dealing with electrical hazards and for erecting, maintaining, and disassembling the fall protection systems and falling object protection systems being used; the proper use of the scaffold, and the proper handling of materials on the scaffold; the maximum intended load and the load-carrying capacities of the scaffolds used; and any other pertinent requirements.

- f. The Contractor must ensure that each employee who is involved in erecting, disassembling, moving, operating, repairing, maintaining, or inspecting a scaffold is trained by a competent person to recognize any hazards associated with the work in question.
  - g. When the Contractor has reason to believe that a person at the Project Site lacks the skill or understanding needed for safe work involving the erection, use or dismantling of scaffolds, the contractor must require the training or retraining of each such employee so that the requisite proficiency is demonstrated. This training or retraining is required in at least the following situations: where changes at the worksite present a hazard about which an employee has not been previously trained; or where changes in the types of scaffolds, fall protection, falling object protection, or other equipment present a hazard about which an employee has not been previously trained; or where inadequacies in an affected employee's work involving scaffolds indicate that the employee has not retained the requisite proficiency.
  - h. Mast climber platforms must be erected, used, and dismantled according to the manufacturer's specification. Special care must be taken to ensure there is no corrosion of scaffold components. The Contractor must ensure that loading and balancing limitations are observed; that bases are adequately supported, and that anchorages are sufficient. The travel path must be free of obstructions. Full guardrail systems and adequate planking are maintained, and tie-offs during dismantling the platform are not removed prematurely.
  - i. All scaffolding systems including mast climber platforms must require a safety inspection and must be clearly tagged cleared for use by third party before they can be put into service.
11. Fall Protection (CFR 29 OSHA 1926.501)
- a. The Contractor must determine if the walking/working surfaces on which any persons at the Site are to travel have the strength and structural integrity to support the persons safely. Any persons at the Site must be allowed on those surfaces only when the surfaces have the requisite strength and structural integrity.
  - b. Each person at the Site on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge which is 6 feet (1.8 m) or more above a lower level must be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems.
  - c. Guardrail systems and their use must comply with the following provisions: Top edge height of top rails, or equivalent guardrail system members, must be 42 inches plus or minus 3 inches above the walking/working level. When conditions warrant, the height of the top edge may exceed the 45-inch height, provided the guardrail system meets all other criteria of this paragraph. Note: When employees are using stilts, the top edge height of the top rail, or equivalent member, must be increased an amount equal to the height of the stilts.
  - d. Midrails, screens, mesh, intermediate vertical members, or equivalent intermediate structural members must be installed between the top edge of the guardrail system and the walking/working surface when there is no wall or parapet wall at least 21 inches high. Midrails, when used, must be installed at a height midway between the top edge of the guardrail system and the walking/working level. Screens and mesh, when used, must extend from the top rail to the walking/working level and along the entire opening between top rail supports.
  - e. Guardrail systems must be capable of withstanding, without failure, a force of at least 200 pounds applied within 2 inches of the top edge, in any outward or downward direction, at any point along the top edge. When the 200 pound test load is applied in a downward direction, the top edge of the guardrail must not deflect to a height less than 39 inches above the walking/working level.
  - f. Midrails, screens, mesh, intermediate vertical members, solid panels, and equivalent structural members must be capable of withstanding, without failure, a force of at least 150 pounds applied in any downward or outward direction at any point along the midrail

- or other member. Guardrail systems must be so surfaced as to prevent injury to an employee from punctures or lacerations, and to prevent snagging of clothing. The ends of all top rails and midrails must not overhang the terminal posts, except where such overhang does not constitute a projection hazard.
- g. The Contractor must ensure provide a training program for each employee who might be exposed to fall hazards. The program must enable each employee to recognize the hazards of falling and must train each employee in the procedures to be followed in order to minimize these hazards.
  - h. Where possible, site personnel must be protected from falls through use of guardrail systems. Personal fall arrest systems must be used only where guardrail systems are technically not possible. The use of personal fall arrest systems must comply with 29 CFR 1926.502(d).
12. Excavations (CFR 29 OSHA 1926.651)
- a. All surface encumbrances that are located so as to create a hazard to site personnel must be removed or supported, as necessary, to safeguard employees.
  - b. The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installations that reasonably may be expected to be encountered during excavation work, must be determined prior to opening an excavation. When excavation operations approach the estimated location of underground installations, the exact location of the installations must be determined by safe and acceptable means. While the excavation is open, underground installations must be protected, supported or removed as necessary to safeguard employees.
  - c. A stairway, ladder, ramp or other safe means of egress must be located in trench excavations that are 4 feet or more in depth so as to require no more than 25 feet of lateral travel for employees.
  - d. Persons on the Site exposed to public vehicular traffic must be provided with, and must wear; warning vests or other suitable garments marked with or made of reflectorized or high-visibility material.
  - e. No person on the Site shall be permitted underneath loads handled by lifting or digging equipment. Persons must be required to stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials. Operators may remain in the cabs of vehicles being loaded or unloaded when the vehicles are equipped, to provide adequate protection for the operator during loading and unloading operations.
  - f. When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system must be utilized such as barricades, hand or mechanical signals, or stop logs. If possible, the grade should be away from the excavation.
  - g. The Contractor must perform testing and controls to prevent exposure to harmful levels of atmospheric contaminants and to assure acceptable atmospheric conditions in accordance with the following requirements: Where oxygen deficiency (atmospheres containing less than 19.5 percent oxygen) or a hazardous atmosphere exists or could reasonably be expected to exist, such as in excavations in landfill areas or excavations in areas where hazardous substances are stored nearby, the atmospheres in the excavation must be tested before employees enter excavations greater than 4 feet in depth. Adequate precautions must be taken to prevent employee exposure to atmospheres containing less than 19.5 percent oxygen and other hazardous atmospheres. These precautions include providing proper respiratory protection or ventilation.
  - h. Each person in an excavation or trench must be protected from cave-ins by an adequate protective system designed with the capacity to resist without failure all loads that are intended or could reasonably be expected to be applied or transmitted to the system.
  - i. The slopes and configurations of sloping and benching systems must be selected and constructed by the Contractor and supervised by a competent person.

13. Concrete and Masonry Construction (CFR 29 OSHA 1926.701)
  - a. No construction loads must be placed on a concrete structure or portion of a concrete structure unless the Contractor determines, based on information received from a person who is qualified in structural design, that the structure or portion of the structure is capable of supporting the loads.
  - b. All protruding reinforcing steel, onto and into which Site persons could fall, must be guarded to eliminate the hazard of impalement.
  - c. No persons on the Site (except those essential to the post-tensioning operations) shall be permitted to be behind the jack during tensioning operations. Signs and barriers must be erected to limit personnel access to the post-tensioning area during tensioning operations.
  - d. No person shall be permitted to ride concrete buckets. No person shall be permitted to work under concrete buckets while buckets are being elevated or lowered into position. To the extent practical, elevated concrete buckets must be routed so that no person, or the fewest number of persons, is exposed to the hazards associated with falling concrete buckets. No person shall be permitted to apply a cement, sand, and water mixture through a pneumatic hose unless the person is wearing protective head and face equipment.
  - e. A limited access zone must be established whenever a masonry wall is being constructed. The limited access zone must be established prior to the start of construction of the wall. The limited access zone must be equal to the height of the wall to be constructed plus four feet, and must run the entire length of the wall. The limited access zone must be established on the side of the wall which will be unscaffolded. The limited access zone must be restricted to entry by persons actively engaged in constructing the wall. No other persons shall be permitted to enter the zone.
14. Steel Erection (CFR 29 OSHA 1926.752)
  - a. Before authorizing the commencement of steel erection, the Contractor must ensure that the steel erector is provided with the following written notifications: The concrete in the footings, piers and walls and the mortar in the masonry piers and walls has attained, on the basis of an appropriate ASTM standard test method of field-cured samples, either 75 percent of the intended minimum compressive design strength or sufficient strength to support the loads imposed during steel erection. Any repairs, replacements and modifications to the anchor bolts were conducted.
  - b. The Contractor must ensure that the following is provided and maintained: Adequate access roads into and through the site for the safe delivery and movement of derricks, cranes, trucks, other necessary equipment, and the material to be erected and means and methods for pedestrian and vehicular control. Exception: This requirement does not apply to roads outside of the construction site. A firm, properly graded, drained area, readily accessible to the work with adequate space for the safe storage of materials and the safe operation of the erector's equipment.
  - c. All hoisting operations in steel erection must be pre-planned per a Site-specific erection plan. Where the Contractor elects, due to conditions specific to the site, to develop alternate means and methods that provide personnel protection, it must be detailed in a site-specific erection plan developed by a qualified person and available at the work site.
  - d. Where technically possible, the Contractor must protect personnel from falls during leading edge work through the use of engineered systems designed to provide ample anchorage points along the leading edge of the work.
15. Demolition (CFR 29 OSHA 1926.850)
  - a. Prior to permitting personnel to start demolition operations, a written engineering survey must be made, by a competent person, of the structure to determine the condition of the framing, floors, and walls, and possibility of unplanned collapse of any portion of the structure. Any adjacent structure where personnel may be exposed must also be similarly checked. The Contractor must have written evidence that such a survey has been performed. All electric, gas, water, steam, sewer, and other service lines must be shut off, capped, or otherwise controlled, outside the building line before demolition work

- is started. In each case, any utility company which is involved must be notified in advance.
- b. When debris is dropped through holes in the floor without the use of chutes, the area onto which the material is dropped must be completely enclosed with barricades not less than 42 inches high and not less than 6 feet back from the projected edge of the opening above. Signs, warning of the hazard of falling materials, must be posted at each level. Removal must not be permitted in this lower area until debris handling ceases above. All floor openings, not used as material drops, must be covered over with material substantial enough to support the weight of any load which may be imposed. Such material must be properly secured to prevent its accidental movement. Except for the cutting of holes in floors for chutes, holes through which to drop materials, preparation of storage space, and similar necessary preparatory work, the demolition of exterior walls and floor construction must begin at the top of the structure and proceed downward. Each story of exterior wall and floor construction must be removed and dropped into the storage space before commencing the removal of exterior walls and floors in the story next below.
  - c. Personnel entrances to multistory structures being demolished must be completely protected by sidewalk sheds or canopies, or both, providing protection from the face of the building for a minimum of 8 feet. All such canopies must be at least 2 feet wider than the building entrances or openings (1 foot wider on each side thereof), and must be capable of sustaining a load of 150 pounds per square foot.
  - d. To the extent possible, mechanical demolition must be conducted using wet methods to control personnel's and the public's exposure to dust.
16. **Blasting and Use of Explosives (CFR 29 OSHA 1926.900)**
- a. The Contractor must permit only authorized and qualified persons to handle and use explosives. Smoking, firearms, matches, open flame lamps, and other fires, flame or heat producing devices and sparks must be prohibited in or near explosive magazines or while explosives are being handled, transported or used. No person shall be allowed to handle or use explosives while under the influence of intoxicating liquors, narcotics, or other dangerous drugs.
  - b. All explosives must be accounted for at all times. Explosives not being used must be kept in a locked magazine, unavailable to persons not authorized to handle them. The contractor must maintain an inventory and use record of all explosives. Appropriate authorities must be notified of any loss, theft, or unauthorized entry into a magazine. No explosives or blasting agents shall be abandoned.
  - c. No fire shall be fought where the fire is in imminent danger of contact with explosives. All employees must be removed to a safe area and the fire area guarded against intruders.
17. **Ladders (CFR 29 OSHA 1926.1051)**
- a. A stairway or ladder must be provided at all personnel points of access where there is a break in elevation of 19 inches or more, and no ramp, runway, sloped embankment, or personnel hoist is provided. Employees must not use any spiral stairways that will not be a permanent part of the structure on which construction work is being performed. A double-cleated ladder or two or more separate ladders must be provided when ladders are the only mean of access or exit from a working area for 25 or more persons, or when a ladder is to serve simultaneous two-way traffic.
  - b. When a building or structure has only one point of access between levels, that point of access must be kept clear to permit free passage of personnel. When work must be performed or equipment must be used such that free passage at that point of access is restricted, a second point of access must be provided and used. The Contractor must provide and install all stairway and ladder fall protection systems required before personnel begin any work that necessitates the installation and use of stairways, ladders, and their respective fall protection systems.
  - c. The Contractor must provide a training program for each employee who might be exposed to hazards of working on ladders. The program must enable each employee to

- recognize the hazards - and must train each employee in the procedures to be followed in order to minimize these hazards.
18. Power Transmission and Distribution (CFR 29 OSHA 1926.950)
    - a. Existing conditions must be determined before starting work, by an inspection or a test. Such conditions shall include, but not be limited to, energized lines and equipment, conditions of poles, and the location of circuits and equipment, including power and communication lines, CATV and fire alarm circuits.
    - b. Electric equipment and lines must be considered energized until determined to be de-energized by tests or other appropriate methods or means. Operating voltage of equipment and lines must be determined before working on or near energized parts. No personnel shall be permitted to approach or take any conductive object without an approved insulating handle closer to exposed energized parts than shown in OSHA 1926.950 Table V-1, unless: The person is insulated or guarded from the energized part (gloves or gloves with sleeves rated for the voltage involved shall be considered insulation of the employee from the energized part), or the energized part is insulated or guarded from him and any other conductive object at a different potential, or the person is isolated, insulated, or guarded from any other conductive object(s), as during live-line bare-hand work.
    - c. The minimum working distance and minimum clear hot stick distances stated in OSHA 1926.950 Table V-1 must not be violated. The minimum clear hot stick distance is that for the use of live-line tools held by linemen when performing live-line work. Conductor support tools, such as link sticks, strain carriers, and insulator cradles, may be used: Provided, that the clear insulation is at least as long as the insulator string or the minimum distance specified in OSHA 1926.950 Table V-1 for the operating voltage.
  19. Cranes and Derricks (CFR 1926 Subparts V - Power Transmission and Distribution, CC - Cranes and Derrick in Construction)
    - a. "Ground conditions" means the ability of the ground to support the equipment (including slope, compaction, and firmness). "Supporting materials" means blocking, mats, cribbing, marsh buggies (in marshes/wetlands), or similar supporting materials or devices.
    - b. The equipment must not be assembled or used unless ground conditions are firm, drained, and graded to a sufficient extent so that, in conjunction (if necessary) with the use of supporting materials, the equipment manufacturer's specifications for adequate support and degree of level of the equipment are met. The requirement for the ground to be drained does not apply to marshes/wetlands.
    - c. The Contractor must: Ensure that ground preparations necessary to meet the requirements have been completed and tested. Inform the user of the equipment and the operator of the location of hazards beneath the equipment set-up area (such as voids, tanks, utilities) if those hazards are identified in documents (such as site drawings, as-built drawings, and soil analyses) that are in the possession of the Contractor (whether at the site or off-site) or the hazards are otherwise known to the Contractor.
    - d. If the A/D director for the crane and derrick Subcontractor (or Sub-subcontractor) determines that ground conditions do not meet the requirements for safe operation of the crane/derrick, that Subcontractor (or Sub-subcontractor) must have a discussion with the Contractor regarding the ground preparations that are needed so that, with the use of suitable supporting materials/devices (if necessary), safe operation requirements can be met.
    - e. Assembly/disassembly must be directed by a person who meets the criteria for both a competent person and a qualified person, or by a competent person who is assisted by one or more qualified persons ("A/D director"). The A/D director must understand the applicable assembly/disassembly procedures. The A/D director must review the applicable assembly/disassembly procedures immediately prior to the commencement of assembly/disassembly unless the A/D director understands the procedures and has applied them to the same type and configuration of equipment (including accessories, if any).



- f. Before commencing assembly/disassembly operations, the A/D director must ensure that the crew members understand all of the following: Their tasks, the hazards associated with their tasks, and the hazardous positions/locations that they need to avoid.
- g. Before a crew member goes to a location that is out of view of the operator and is either in, on, or under the equipment, or near the equipment (or load) where the crew member could be injured by movement of the equipment (or load), the crew member must inform the operator that he/she is going to that location. Where the operator knows that a crew member went to a location, the operator must not move any part of the equipment (or load) until the operator is informed in accordance with a pre-arranged system of communication that the crew member is in a safe position.
- h. The Contractor must coordinate with a power line owner/operator prior to use of a crane/derrick near a power line. The power line owner/operator's registered professional engineer, who is a qualified person with respect to electrical power transmission and distribution, shall determine the minimum clearance distance that must be maintained to prevent electrical contact in light of the on-site conditions. The factors that must be considered in making this determination include, but are not limited to: Conditions affecting atmospheric conductivity; time necessary to bring the equipment, load line, and load (including rigging and lifting accessories) to a complete stop; wind conditions; degree of sway in the power line; lighting conditions, and other conditions affecting the ability to prevent electrical contact.

#### 1.4 CONTRACTOR SAFETY RESPONSIBILITIES FOR EMERGENCIES

- A. The Contractor must display a list of "Emergency Telephone Numbers" at visible locations of project site including, as a minimum, outside of the Contractor's trailer or office; a minimum list of Emergency Telephone Numbers is shown at the end of this section. In the event of an emergency or unsafe site condition, site personnel must be instructed to immediately notify the Safety Supervisor. In case of a critical injury or a fatality, site personnel must be instructed to immediately call 911 and to immediately notify the safety supervisor. The safety supervisor must immediately call 911 (if others have not already done so) and then notify MOSH, the Owner's On-Site Representative, and the County Project Manager within one hour of the incident.
- B. The Contractor must train site personnel to know how to evacuate the Project Site in the event of an emergency. The Contractor must train site personnel to be aware of all the possible obstructions to entry and exit routes, to know an escape path, and to note the location of fire extinguishers before starting work.
- C. Contractors must keep a current list of names of all site personnel including all employees of the Contractor, the Subcontractors and Sub-subcontractors at all time to be able to account for everyone in the event of an emergency.
- D. EMERGENCY TELEPHONE NUMBERS
  - 1. 911 General Emergencies (Ambulance, Fire and Police)
  - 2. SAFETY SUPERVISOR (office and cell phone number)
  - 3. MOSH
  - 4. PROJECT MANAGER
  - 5. OWNER'S REPRESENTATIVE

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

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

**END OF SECTION**



**SECTION 01 4000**  
**QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and other Division 1 Specification Sections, apply to this Section.
- B. Refer to Section 01 4500 for additional Quality Control requirements.

**1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Maintain quality assurance/control over suppliers, manufacturers, products, services, site conditions and workmanship to produce Work of specified quality.
- C. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and quality-control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and 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/Engineer, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- D. Owner will engage a Special Inspection Agency to provide quality control, inspections testing and observations per Montgomery County's Special Inspections Program Requirements and final inspection plan as proposed by the Contractor and agreed upon with Montgomery County Inspection Services.
- E. Related Sections include the following:
  - 1. Division 1 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
  - 2. Division 1 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
  - 3. Other Specification 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 administration activities performed by Architect/Engineer.
- C. Mockups: Full-size, physical assemblies that are constructed on-site. 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. Approved mockups establish the standard by which the Work will be judged.

- D. Preconstruction Testing: Tests and inspections that are performed specifically for the Project before products and materials are incorporated into the Work to verify performance or compliance with specified criteria.
- E. Product Testing: Tests and inspections that are performed by a WACEL, NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
  - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- F. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- G. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.
  - 1. 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 tradespeople of the corresponding generic name.
- J. Experienced: When used with an entity, "experienced" means having successfully completed a minimum of five previous projects similar in size and scope to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.
- K. Reference Standards: Comply with requirements of referenced standards specified in the Contract Documents except more rigid requirements are specified or are required by applicable codes and regulations. Unless a reference date is specified, conform to the reference standard current on the date the Owner issued the Bidding Documents. Specific standards referenced in building codes and regulations supersede this requirement. Reference Standards cannot change contractual relationship of parties to the Contract. Keep a copy of specified reference standards on-site during progress of specific work.

#### 1.4 CONFLICTING REQUIREMENTS

- A. General: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer uncertainties and requirements that are different, but apparently equal, to Architect/Engineer for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect/Engineer for a decision before proceeding.
- C. Comply completely with manufacturer's instructions. Should manufacturer's instructions conflict with Contract Documents, request clarification from Architect/Engineer.

## 1.5 DELEGATED DESIGN

- 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. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect/Engineer.

## 1.6 SUBMITTALS

- A. Qualification Data: Submit qualification data for all testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. Schedule of Tests and Inspections: Prepare in tabular form and include the following:
  - 1. Specification Section number and title.
  - 2. Description of test and inspection.
  - 3. Identification of applicable standards.
  - 4. Identification of test and inspection methods.
  - 5. Number of tests and inspections required.
  - 6. Time schedule or time span for tests and inspections.
  - 7. Entity responsible for performing tests and inspections.
  - 8. Requirements for obtaining samples.
  - 9. Unique characteristics of each quality-control service.
- C. Reports: Prepare and submit certified written reports that include the following:
  - 1. Date of issue.
  - 2. Project title and number.
  - 3. Name, address, and telephone number of testing agency.
  - 4. Dates and locations of samples and tests or inspections.
  - 5. Names of individuals making tests and inspections.
  - 6. Description of the Work and test and inspection method.
  - 7. Identification of product and Specification Section.
  - 8. Complete test or inspection data.
  - 9. Test and inspection results and an interpretation of test results.
  - 10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
  - 11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
  - 12. Name and signature of laboratory inspector.
  - 13. Recommendations on retesting and reinspecting.
- 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.
- E. 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.

## 1.7 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements. Perform Work by persons qualified to produce workmanship of specified quality.
- B. 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.
- C. 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.
- D. 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.
- E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of Maryland and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the systems, assemblies, or products that are similar to those indicated for this Project in material, design, and extent.
- F. Specialists: Certain sections of the Specifications require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
  - 1. Requirement for specialists shall not supersede building codes and regulations governing the Work.
- G. Testing Agency Qualifications: A WACEL, NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
  - 1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
  - 2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.
- H. Factory-Authorized Service Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.
- 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. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
    - e. When testing is complete, remove test specimens, assemblies, mockups, and laboratory mockups; do not reuse products on Project.
  - 2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect/Engineer, 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.

- J. Mockups: Erect mock-ups for review at the site in accordance with requirements of the individual Specification Sections and as detailed on the drawings. Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups at a location and of size indicated or, if not indicated, as directed by Architect/Engineer.
  2. Notify Architect/Engineer seven days in advance of dates and times when mockups will be constructed.
  3. Demonstrate the proposed range of aesthetic effects and workmanship.
  4. Obtain Architect/Engineer's approval of mockups before starting work, fabrication, or construction. Revise as needed to obtain Architect/Engineer's approval
    - a. Allow fifteen days for initial review and each re-review of each mockup.
  5. Maintain mockups during construction in an undisturbed condition as a minimum standard of quality for accepting the completed Work.
  6. Demolish and remove mockups when directed, unless otherwise indicated.

## 1.8 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are specifically indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
  3. Independent inspections and testing services which are the Owner's responsibility, including field quality control requirements, are indicated in the following Sections:
    - a. Section 01 41 00 - Air Barrier System
    - b. Section 03 10 00 - Concrete Forming and Accessories
    - c. Section 03 20 00 - Concrete Reinforcing
    - d. Section 03 35 13 - High-Tolerance Concrete Floor Finishing
    - e. Section 03 30 00 - Cast-In-Place Concrete.
    - f. Section 04 20 00 - Unit Masonry.
    - g. Section 05 12 00 - Structural Steel.
    - h. Section 05 12 13 - Architecturally Exposed Structural Steel
    - i. Section 05 21 00 - Steel Joist Framing
    - j. Section 05 31 00 - Steel Decking.
    - k. Section 05 40 00 - Cold-formed metal framing
    - l. Section 07 27 10 - Fluid-Applied Membrane Air Barriers
    - m. Section 07 54 19 - Thermoplastic Membrane Roofing (PVC)
    - n. Section 07 55 56 - Hot Rubberized Asphalt Protected Membrane Roofing
    - o. Section 07 55 63 - Vegetated Protected Membrane Roofing
    - p. Section 07 81 00 - Applied Fireproofing
    - q. Section 07 84 00 - Firestopping
    - r. Section 07 84 46 - Fire-Resistive Joint Systems
    - s. Section 09 96 46 - Intumescent Painting
    - t. Section 31 20 00 - Earth Moving.
    - u. Section 31 20 05 - Building Earthwork
    - v. Section 31 50 00 - Excavation Support and Protection
    - w. Section 31 60 00 - Geopier Rammed Aggregate Piers
    - x. Section 32 18 16.13 - Playground Protective Surfacing
    - y. Section 32 12 16 - Hot-Mix Asphalt Paving.
    - z. Section 32 13 13 - Cement Concrete Paving.
    - aa. Section 32 32 13 - Segmental Retaining Walls
    - ab. Section 33 10 00 - Utility Standards

- ac. Section 33 10 05 - Water Distribution System
  - ad. Section 33 30 00 - Sanitary Sewerage
  - ae. Section 33 41 00 - Storm Drainage
- B. Contractor's Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. 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.
- 1. 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.
  - 2. Notify testing agencies at least 48 hours in advance of time when Work that requires testing or inspecting will be performed. Do not install new work over work requiring inspection/testing until inspection/testing is completed.
  - 3. Cooperate with inspection/testing agencies; provide access to the work
  - 4. Provide the agencies with manufacturer's operations, test reports, design mixes, and submittal data and an adequate number of samples to be tested.
  - 5. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  - 6. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
  - 7. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
  - 8. Pay for additional testing required when initial tests indicate work does not conform to Contract Documents.
- C. Manufacturer's Field Services: Where indicated in respective Sections, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Within seven (7) days of inspection, provide representative's observations, findings and any directions in writing as specified in Division 1 Section "Submittal Procedures."
- D. Testing Agency Responsibilities: Provide services in compliance with Contract Documents, governing authorities and specified standards. Cooperate and coordinate with Owner, Architect/Engineer and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections as follows:
- 1. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  - 2. Conduct and interpret specified tests and inspections and shall clearly state in each report whether tested and inspected work complies with or deviates from Contract requirements.
  - 3. Notify Owner, Architect/Engineer and Contractor promptly, within twenty four (24) hours, of irregularities or deficiencies observed in the Work during performance of its services.
  - 4. Promptly (within 3 days) submit a certified written (typed) report to Owner, Architect/Engineer and Contractor of each test, inspection, and similar quality-control service. Each report shall include the information required in each technical specification section and the following:
    - a. Date issued
    - b. Project title and number
    - c. Testing laboratory name, address, telephone and facsimile number
    - d. Name, employment and signature of the individual(s) making the test, or inspection
    - e. Date and time of test, sampling, or inspection
    - f. Identification of product being tested, or Specification Section requiring testing
    - g. Location of sample or test in the project
    - h. Ambient conditions at the time of sample-taking, or test
    - i. Type of inspection or test
    - j. Results and interpretation of tests



- k. Comments or professional opinion as to whether tested or inspected Work complies with the requirements of the Contract Documents
  - l. Recommendations for re-testing, or re-inspection, as applicable.
  - m. Signature and seal of professional engineer responsible for oversight of test or inspection.
- 5. Provide additional tests and inspections related to the Work, as requested by the Owner, for additional compensation.
- 6. Attend progress meetings, as requested by Owner, to discuss testing and inspection issues.
- 7. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
- 8. Do not perform any duties of Contractor.
- E. 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. Safe 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. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  - 6. Security and protection for samples and for testing and inspecting equipment at Project site.
- F. 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 inspecting.
  - 1. Schedule times for tests, inspections, obtaining samples, and similar activities.

#### 1.9 SPECIAL INSPECTIONS SERVICES

- A. Testing and Inspection Service: Owner will engage an Independent Testing and Laboratory Agencies to monitor the Contractor's Quality Control Program and the Special Inspections Program. The Owner's monitoring activities in no way relieve the Contractor of responsibility for providing Quality Control or compliance with Contract Requirements.
  - 1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviewing the completeness and adequacy of those procedures to perform the Work.
  - 2. Notifying Architect/Engineer and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
  - 3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect/Engineer with copy to Contractor and to authorities having jurisdiction.
  - 4. Submitting a final report of special tests and inspections at Substantial Completion, including a list of unresolved deficiencies.
  - 5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
  - 6. Retesting and reinspecting corrected work.
  - 7. Testing Agency shall make inspections, conduct and interpret tests, and state in each report whether Work complies with or deviates from requirements. Distribute reports within a maximum of 10 days of the inspection to Architect, Owner, Developer, Engineer, Contractor (1 field, 1 office), and the Building Authority.
  - 8. Each report shall include the permit number and building address, and shall identify the individual performing the inspection or test.

9. The report shall call special attention to any conditions that were not anticipated, or which are not in conformance with plans, specifications, applicable standards or the Building Code.
10. Reports shall bear the signature of the registered engineer in charge of inspection or testing.
11. Reports of corrective measures taken and adequacy of such measures shall bear the seal and signature of the Engineer in responsible charge of testing or inspection.
12. Inspection personnel shall provide evidence of their competence to perform the inspections for which they are engaged, including as a minimum evidence of competence appropriate certification by Washington Area Council of Engineering Laboratories (WACEL), the National Institute for Certification in Engineering Technologies (NICET), or some other organization whose programs are recognized by Montgomery County. When such applicable program is not available for evidence of competence, the individual involved shall furnish personal background information bearing upon his/her competence for County review and acceptance.
13. Engineering testing laboratory engaged to perform services relative to materials testing shall meet requirements of ASTM E329 and shall be accredited by Washington Area Council of Engineering Laboratories (WACEL), the American Association for Laboratory Accreditation (AALA), the National Voluntary Laboratory Accreditation Program (NVLAP) or some other organization whose laboratory accreditation program is recognized by Montgomery County.
14. At the completion of each area of work where indicated, provide certification as specified.

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

## **PART 3 EXECUTION**

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

- A. 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/Engineer.
  4. Identification of testing agency or special inspector conducting test or inspection.
- B. Maintain log at Project site. Post changes and modifications as they occur. Provide access to test and inspection log for Architect/Engineer's reference during normal working hours.

### **3.2 DEFICIENT WORK**

- A. General: If any materials or equipment selected for testing fails to meet the requirements of the Contract Documents, such materials or equipment shall be subject to removal and replacement by the Contractor. These non-conforming materials shall be removed from the site and replaced with materials or equipment meeting the requirements of the Contract Document. At the discretion of the Owner, the installed defective materials and equipment may be permitted to remain in place subject to a proper adjustment of the Contract Sum.
- B. If tests or inspections reveal failure of materials to comply with the requirements of the Contract Documents, the costs of additional tests by the Owner, and compensation for the Owner's and Architect/Engineer's additional services, made necessary by such failure, shall be charged to the Contractor by Change Order.

### **3.3 REPAIR AND PROTECTION**

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes to eliminate evidence of inspection, testing and/or sample taking.

1. Comply with the Contract Document requirements for Division 1 Section "Cutting and Patching."
  - 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.
- 3.4 TESTING AND INSPECTION MATRIX (directly following)
- The list of testing and inspections that may be required includes but is not limited to the following:

Specification Section	Specification	Testing and Inspection Services
03 30 00	Concrete Forming and Accessories	<ol style="list-style-type: none"> <li>1. Inspect formwork</li> <li>2. Prepare letters for form removal (stripping)</li> </ol>
03 30 00	Concrete Reinforcing	<ol style="list-style-type: none"> <li>1. Inspect reinforcing steel               <ol style="list-style-type: none"> <li>a. Size</li> <li>b. Spacing</li> <li>c. Quantity</li> <li>d. Tie wire</li> <li>e. Lap splicing</li> </ol> </li> </ol>
03 30 00	Cast-In-Place Concrete	<ol style="list-style-type: none"> <li>1. Verify suitability of subgrade</li> <li>2. Verify concrete mix used is as approved</li> <li>3. Observe concrete placement</li> <li>4. Verify curing procedures including curing temperatures</li> <li>5. Test concrete delivered to the project for:               <ol style="list-style-type: none"> <li>a. Slump</li> <li>b. Air Content</li> <li>c. Temperature</li> <li>d. Unit Weight</li> </ol> </li> <li>6. Make, cure and test concrete cylinder compressive strength samples</li> <li>7. Inspect anchors cast in concrete</li> <li>8. Inspect post-installed anchors</li> </ol>
03 30 00	High-Tolerance Concrete Floor Finishing	<ol style="list-style-type: none"> <li>1. Perform floor flatness testing</li> </ol>
04 20 00	Unit Masonry	<ol style="list-style-type: none"> <li>1. Periodic inspection of masonry construction               <ol style="list-style-type: none"> <li>a. CMU walls</li> <li>b. Mortar joints</li> <li>c. Bond beams</li> <li>d. Lintels</li> <li>e. Reinforcing steel</li> <li>f. Grouted cells and grout space</li> <li>g. Mortar and Grout proportions</li> <li>h. Anchor bolts</li> </ol> </li> <li>2. Compressive strength testing of masonry samples               <ol style="list-style-type: none"> <li>a. Mortar</li> <li>b. Grout</li> <li>c. Brick</li> <li>d. Block</li> <li>e. Prisms</li> </ol> </li> <li>3. Verify <math>f'm</math> prior to construction</li> <li>4. Verify compliance with approved submittals</li> <li>5. Verify type, size and location of anchors</li> <li>6. Verify hot and cold weather masonry practices</li> <li>7. Verify installation of post-installed anchors</li> </ol>

05 12 00	Structural Steel framing	<ol style="list-style-type: none"> <li>1. Audit of Steel fabrication QC process</li> <li>2. Inspection of anchor bolts, washers and nuts</li> <li>3. Visual inspection of welds – size, length and location</li> <li>4. Verification of bolt tension</li> <li>5. Ultrasonic testing of full-penetration welds</li> <li>6. Test and inspect shear studs</li> <li>7. Verify that manufacturer certifications for materials are available</li> <li>8. Steel – Prior to welding <ol style="list-style-type: none"> <li>a. Verify that WPSs are available</li> <li>b. Observe material identification</li> <li>c. Verify welder identification system</li> <li>d. Observe fit-up of groove and fillet welds</li> <li>e. Verify configuration and finish of access holes</li> </ol> </li> <li>9. Steel – During Welding <ol style="list-style-type: none"> <li>a. Verify welders are qualified</li> <li>b. Observe control and handling of welding consumables</li> <li>c. Check environmental conditions</li> <li>d. Verify no welding over cracked tack welds</li> <li>e. Verify WPSs are followed</li> <li>f. Observe welding techniques</li> </ol> </li> <li>10. Steel – after welding <ol style="list-style-type: none"> <li>a. Verify weld cleanliness</li> <li>b. Inspect arc strikes</li> <li>c. Inspect K-area</li> <li>d. Verify backing and weld tabs removed if required</li> <li>e. Observe repair activities</li> </ol> </li> <li>11. Steel – prior to bolting <ol style="list-style-type: none"> <li>a. Verify fasteners labeled per ASTM</li> <li>b. Verify proper use of fasteners</li> <li>c. Verify proper bolting procedure</li> <li>d. Observe connecting elements</li> <li>e. Observe pre-installation verification testing</li> <li>f. Verify proper material storage</li> </ol> </li> <li>12. Steel – during bolting <ol style="list-style-type: none"> <li>a. Verify fastener assemblies</li> <li>b. Check joints prior to pretensioning</li> <li>c. Verify proper pretensioned and slip-critical joint installation</li> <li>d. Verify fasteners not turned by the wrench are prevented from rotating</li> <li>e. Check that fasteners are pretensioned</li> </ol> </li> <li>13. Check setting of anchor bolts, bearing plates &amp; embeds</li> <li>14. Check members for plumbness, elevation &amp; alignment</li> <li>15. Check braces, locations and connection details</li> </ol>
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05 21 00	Steel Joist Framing	<ol style="list-style-type: none"> <li>1. Audit of Steel fabrication QC process</li> <li>2. Verify adequate end bearing</li> <li>3. Inspection of joist bracing</li> <li>4. Visual inspection of welds – size, length &amp; location</li> <li>5. Verification of bolt tension</li> <li>6. Ultrasonic testing of full-penetration welds</li> <li>7. Check joist alignment</li> <li>8. Verify bridging installation</li> <li>9. Verify use of high-strength bolts</li> </ol>
05 31 00	Steel Decking	<ol style="list-style-type: none"> <li>1. Visually verify decking alignment &amp; support</li> <li>2. Verify adequate end bearing</li> <li>3. Visual inspection of welds</li> <li>4. Inspection of side lap attachments</li> <li>5. Verify touch up galvanizing</li> <li>6. Verify materials are as approved</li> <li>7. Verify welding consumables and fasteners</li> </ol>
05 40 00	Cold Form Metal Framing	<ol style="list-style-type: none"> <li>1. Check members for proper:               <ol style="list-style-type: none"> <li>a. Size &amp; gage</li> <li>b. Spacing</li> <li>c. Plumbness and alignment</li> <li>d. Bearing</li> <li>e. Reinforcement</li> <li>f. Attachments</li> <li>g. Connections to structural frame</li> </ol> </li> <li>2. Visual inspection of welds</li> <li>3. Verify touch up galvanizing</li> </ol>
07 27 00	Fluid-Applied Membrane Air Barriers	<ol style="list-style-type: none"> <li>1. Occasional observations to include:               <ol style="list-style-type: none"> <li>a. Verify continuity of Air Barrier System</li> <li>b. Observe surface preparation by contractor</li> <li>c. Surface priming</li> <li>d. Application temperatures</li> <li>e. Material laps</li> <li>f. Mastic application</li> <li>g. Adhesion to substrate</li> <li>h. Connections between assemblies</li> <li>i. Penetration sealing</li> </ol> </li> </ol>
07 54 19	Thermoplastic Membrane Roofing (PVC)	<ol style="list-style-type: none"> <li>1. Inspection of deck substrate</li> <li>2. Verification of roofing materials:               <ol style="list-style-type: none"> <li>a. Wood Nailers</li> <li>b. Substrate board</li> <li>c. Vapor barrier</li> <li>d. Insulation</li> <li>e. Cover board</li> <li>f. Roofing membrane</li> <li>g. Membrane flashings</li> <li>h. Metalwork</li> <li>i. Expansion joints</li> <li>j. Roof drains</li> </ol> </li> <li>3. Observation of roof flood test</li> </ol>

07 84 00	Firestopping	<ol style="list-style-type: none"> <li>1. Verify qualifications of firestopping installation mechanics</li> <li>2. Inspect penetration preparation</li> <li>3. Verify use of approved materials</li> <li>4. Verify firestopping thickness</li> </ol>
31 20 05	Building Earthwork	<ol style="list-style-type: none"> <li>1. Laboratory testing of proposed fill materials:               <ol style="list-style-type: none"> <li>a. Proctor</li> <li>b. Gradation</li> <li>c. Atterberg Limits</li> <li>d. Moisture Content</li> </ol> </li> <li>2. Verify use of only approved fill materials</li> <li>3. Observe proofrolling of subgrade</li> <li>4. Verify foundation subgrade bearing</li> <li>5. In-place field moisture-density testing</li> <li>6. Verify excavations to proper depth and proper material</li> <li>7. Provide classification of proposed fill materials</li> <li>8. Verify fill lift thickness</li> </ol>
32 32 13	Segmental Retaining Walls	<ol style="list-style-type: none"> <li>1. Verify use of approved materials</li> <li>2. Check lengths of soil and wall reinforcement</li> <li>3. Inspect wall construction</li> <li>4. Laboratory testing of proposed backfill materials:               <ol style="list-style-type: none"> <li>a. Proctor</li> <li>b. Gradation</li> <li>c. Atterberg Limits</li> <li>d. Moisture Content</li> </ol> </li> <li>5. Verify use of only approved fill materials</li> <li>6. Verify suitability of subgrade</li> <li>7. In-place field moisture-density testing</li> </ol>
03 30 00	Concrete Retaining Walls	<ol style="list-style-type: none"> <li>1. Verify foundation bearing capacity</li> <li>2. Inspect reinforcing steel</li> <li>3. Inspect formwork</li> <li>4. Verify concrete mix used is as approved</li> <li>5. Test concrete delivered to the project for:               <ol style="list-style-type: none"> <li>a. Slump</li> <li>b. Air Content</li> <li>c. Temperature</li> </ol> </li> <li>6. Make, cure and test concrete cylinder compressive strength samples</li> </ol>

END OF SECTION





**SECTION 01 4100**  
**THE AIR BARRIER SYSTEM**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. This section includes administrative and procedural requirements for accomplishing an airtight building enclosure that controls infiltration or exfiltration of air.
  - 1. The airtight components of the building enclosure and the joints, junctures and transitions between materials, products, and assemblies forming the air-tightness of the building enclosure are called "the air barrier system". Services include coordination between the trades, the proper scheduling and sequencing of the work, preconstruction meetings, inspections, tests, and related actions, including reports performed by Contractor, by independent agencies, and by governing authorities. They do not include contract enforcement activities performed by Architect.
  - 2. The Contractor shall ensure that the design intent for the building enclosure, consisting of a continuous air barrier system to control air leakage into, or out of the conditioned space, is achieved. The air barrier system shall have the following characteristics:
    - a. It must be continuous, with all joints sealed.
    - b. It must be structurally supported to withstand positive and negative air pressures applied to the building enclosure.
    - c. Connection shall be made between:
      - 1) Foundation and walls.
      - 2) Walls and windows or doors.
      - 3) Different wall systems.
      - 4) Wall and roof.
      - 5) Wall and roof over unconditioned space.
      - 6) Walls, floor and roof across construction, control and expansion joints.
      - 7) Walls, floors and roof to utility, pipe and duct penetrations.
  - 3. Air Barrier Penetrations: All penetrations of the air barrier and paths of air infiltration / exfiltration shall be sealed.
- B. Inspection and testing services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with Contract Document requirements. The Contractor shall hire a third party to **provide testing and inspections** during installation of the air barrier system.
- C. Requirements of this section relate to the coordination between subcontractors required to provide an airtight building enclosure, customized fabrication and installation procedures, not production of standard products.
  - 1. Continuity of the air barrier materials and products with joints to provide assemblies. Continuity of all the enclosure assemblies with joints and transition materials to provide a whole building air barrier system.
  - 2. Specific quality-control requirements for individual construction activities are specified in the sections of the specifications. Requirements in those sections may also cover production of standard products. It is the Contractor's responsibility to ensure that each subcontractor is adequately and satisfactorily performing the quality assurance documentation, tests and procedures required by each section.
  - 3. Specified inspections, tests, and related actions do not limit Contractor's quality-control procedures that facilitate compliance with Contract Document requirements.
  - 4. Requirements for Contractor to provide an airtight building enclosure is not limited by quality-control services required by Architect, Owner, Owners consultants or authorities having jurisdiction and are not limited by provisions of this section.

## 1.2 RELATED SECTIONS (but not limited to)

- A. Division 1 Section Quality Control
- B. Division 1 Section Schedule
- C. Division 1 Section Meetings
- D. Division 3 Section Concrete
- E. Division 5 Section Cold Formed Metal Framing
- F. Division 7 Section Roofing
- G. Division 7 Section Air Barrier
- H. Division 7 Section Sealants
- I. Division 8 Section Windows
- J. Division 8 Section Exterior Doors
- K. Division 8 Section Curtain Walls
- L. Division 8 Section Skylights
- M. Division 8 Section Storefronts and Entrances.

## 1.3 RESPONSIBILITIES

- A. Contractor Responsibilities: Unless otherwise indicated as the responsibility of another identified entity, Contractor shall provide coordination of the trades, and the sequence of construction to ensure continuity of the air barrier system joints, junctures and transitions between materials and assemblies of materials and products, from substructure to walls to roof. Provide quality assurance procedures, testing and verification as specified herein. Facilitate inspections, tests, and other quality-control services specified elsewhere in the Contract Documents and required by authorities having jurisdiction or by the Owner. Costs for these services are included in the Contract Sum.
  - 1. Organize preconstruction meetings between the trades involved in the whole building's air barrier system to discuss where each trade begins and ends and the responsibility and sequence of installation of all the air-tight joints, junctures, and transitions between materials, products and assemblies of products specified in the different sections, to be installed by the different trades.
  - 2. Contractor is responsible for selection of products that are compatible with each other to make the total air barrier system. Not all manufactured products listed in various specification sections will be compatible with each other, the Contractor must select the products that are compatible with each other.
  - 3. Before proceeding with the work build a mock-up, scope as shown on the drawings, location to be coordinated with construction so as to allow the mock-up to remain until building is completed. The mockup should include at least one of each air-tight joint type, juncture, and transition between products, materials and assemblies. The workmanship shall be satisfactory to the architect, the Owner and the Owners exterior wall commissioning agent before proceeding with the work. Construction of the mock-up will be by the sub-contractors responsible for performing the work on the actual building.
- B. Associated Services: Cooperate with agencies performing required inspections, tests, and similar services, and provide reasonable auxiliary services as requested. Notify the agency sufficiently in advance of operations to permit assignment of personnel. Auxiliary services required include, but are not limited to, the following:
  - 1. Provide access to the Work.
  - 2. Furnish incidental labor and facilities necessary to facilitate inspections and tests.
  - 3. Take adequate quantities of representative samples of materials that require testing or assist the agency in taking samples.
  - 4. Deliver samples to testing laboratories.
  - 5. Provide security and protection of samples and test equipment at the Project Site.

- C. Duties of the Testing and Inspection Agency: The independent agency engaged to perform inspections, sampling, and testing of air barrier materials, components and assemblies specified in individual Sections shall cooperate with the Architect, the Owner, the Owners consultants and the Contractor in performance of the agency's duties. The testing agency shall provide qualified personnel to perform required inspections and tests.
  - 1. The agency shall notify the Architect and the Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  - 2. The agency is not authorized to release, revoke, alter, or enlarge requirements of the Contract Documents or approve or accept any portion of the Work.
  - 3. The agency shall not perform any duties of the Contractor.
- D. Coordination: Coordinate the sequence of activities to accommodate required services with a minimum of delay. Coordinate activities to avoid the necessity of removing and replacing construction to accommodate inspections and tests.
  - 1. The Contractor is responsible for scheduling times for inspections, tests, taking samples, and similar activities.

#### 1.4 PERFORMANCE REQUIREMENTS

- A. Compliance Alternatives:
  - 1. Materials: materials used for the air barrier system in the opaque envelope shall have an air permeance not to exceed 0.004 cfm/ft<sup>2</sup> under a pressure differential of 0.3 in. water (1.57psf) (0.02 L/s.m<sup>2</sup> @ 75 Pa) when tested in accordance with ASTM E 2178.

#### 1.5 SUBMITTALS

- A. The independent testing agency engaged by the Contractor shall submit a certified written report, in duplicate, of each inspection, test, or similar service to the Architect. Submit a certified written report, in duplicate, of each inspection, test, or similar service through the Contractor.
  - 1. Submit additional copies of each written report directly to the governing authority, when the authority so directs.
  - 2. Report Data: Written reports of each inspection, test, or similar service include, but are not limited to, the following:
    - a. Date of issue.
    - b. Project title and number.
    - c. Name, address, and telephone number of testing agency.
    - d. Dates and locations of samples and tests or inspections.
    - e. Names of individuals making the inspection or test.
    - f. Designation of the Work and test method.
    - g. Identification of product and Specification Section.
    - h. Complete inspection or test data.
    - i. Test results and an interpretation of test results.
    - j. Ambient conditions at the time of sample taking and testing.
    - k. Comments or professional opinion on whether inspected or tested Work complies with Contract Document requirements.
    - l. Name and signature of laboratory inspector.
    - m. Recommendations on retesting.

#### 1.6 QUALITY ASSURANCE

- A. Qualifications for Air Barrier Testing and Inspection Agencies: Contractor shall engage air Barrier inspection and testing service agencies, including independent testing laboratories, that are prequalified and that specialize in the types of air barrier system inspections and tests to be performed.

**PART 2 - PRODUCTS (NOT USED)****PART 3 - EXECUTION****3.1 REPAIR AND PROTECTION**

- A. Upon completion of inspection, testing, sample taking and similar services, repair damaged construction and restore substrates and finishes. Comply with Contract Document requirements for Division 1 Section "Cutting and Patching."
- B. Protect construction exposed by or for quality-control service activities, and protect repaired construction.
- C. Repair and protection is Contractor's responsibility, regardless of the assignment of responsibility for inspection, testing, or similar services.

**3.2 TESTING AND INSPECTION**

- A. The Owner will hire a third party to **observe** the installation of the air barrier system.
- B. The Contractor shall hire a third party to **provide testing and inspections** during installation of the air barrier system. The testing and inspection agency will provide the following listed services:
  - 1. Qualitative Testing and Inspection:
    - a. Daily reports of observations, with copies to the Owner, Contractor and Architect.
    - b. Continuity of the air barrier system throughout the building enclosure with no gaps, holes.
    - c. Structural support of the air barrier system to withstand design air pressures.
    - d. Masonry and concrete surfaces are smooth, clean and free of cavities, protrusions and mortar droppings.
    - e. Site conditions for application temperature and dryness of substrates.
    - f. Maximum length of exposure time of materials to ultra-violet deterioration.
    - g. Surfaces are properly primed.
    - h. Laps in material are 2" minimum, shingled in the correct direction (or mastic applied on exposed edges), with no fish-mouths.
    - i. Mastic applied on cut edges.
    - j. Roller has been used to enhance adhesion.
    - k. Measure application thickness of liquid-applied materials to manufacturer's specifications for the specific substrate.
    - l. Materials used for compatibility.
    - m. Transitions at changes in direction, and structural support at gaps.
    - n. Connections between assemblies (membrane and sealants) for cleaning, preparation and priming of surfaces, structural support, integrity and continuity of seal.
    - o. All penetrations sealed.
    - p. ASTM E 1186 "Standard Practices for Air Leakage Site Detection in Building Envelopes and Air Retarder Systems."
      - 1) Infrared scanning with pressurization/depressurization.
      - 2) Smoke pencil with pressurization/depressurization.
      - 3) Pressurization/depressurization with use of anemometer
      - 4) Generated sound with sound detection
      - 5) Tracer gas measurement of decay rate
      - 6) Chamber pressurization/depressurization in conjunction with smoke tracers
      - 7) Chamber depressurization using detection liquids
  - 2. Quantitative tests:
    - a. Provide written test reports of all tests performed, with copies to the Owner, Contractor and Architect.
    - b. Material compliance for maximum air permeance, ASTM E 2178.

- c. ASTM E 283, Determining rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors under Specified Pressure Differences Across the Specimen.
- d. Assemblies, ASTM E 2357, test pressure and allowable air leakage rate to be determined by design professional for interior design conditions and location of project.
- e. CAN/CGSB 1986 Standard 149.10, Determination of the Airtightness of Building Envelopes by the Fan Depressurization Method.
- f. CAN/CGSB 1996 Standard 149.15 Determination of the Overall Envelope Airtightness of Office Buildings by the Fan Depressurization Method Using the Building's Air Handling System.
- g. Whole building, floors, or suites, ASTM E779, Determining Airtightness of Buildings Air Leakage Rate by Single Zone Air Pressurization.
- h. Windows and connections to adjacent opaque assemblies, ASTM E783 method B
- i. Tracer gas testing, ASTM E741
- j. Pressure test, ASTM E330
- k. Bond to substrate, ASTM D4541

**END OF SECTION**



**SECTION 014450**  
**BUILDING ENVELOPE DESIGN REQUIREMENTS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes: Design requirements and testing for exterior walls.

**1.2 DEFINITIONS**

- A. General: Definitions included in this Section supersede definitions appearing in reference documents.
- B. Water Leakage:
1. Condensation occurring during water infiltration tests is acceptable.
  2. Water infiltration is acceptable only if following conditions are satisfied:
    - a. Water is contained and drained to exterior.
    - b. Water will not cause damage to adjacent materials or finishes.
    - c. There is no wetting of interior surface that would be visible to building occupants.
    - d. There would be no staining or other damage to any part of completed building or furnishings.
- C. Positive Pressure: Effect of wind blowing against wall for testing; inward acting pressure on system.
- D. Negative Pressure: Effect of suction on lee side of building. For test, outward acting pressure on system.

**1.3 SYSTEM REQUIREMENTS**

- A. Description of System: Exterior wall system, complete with glazed aluminum curtain wall, storefronts, glass, glazing, aluminum windows, shims, sealants, and anchorage devices required to secure entire exterior envelope to building structural system and related appurtenances as necessary to provide complete and weathertight external envelope.
- B. Acceptability of exterior wall is dependent upon successful test performances.
- C. General:
1. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage or moisture disposal.
  2. Requirements shown by details are intended to establish basic dimension of unit, sight lines and profiles of members.
  3. Provide concealed fastening wherever possible.
  4. Coordinate shop drawings and installation of exterior wall to resolve conflicts.
  5. Allow for installation tolerances, expansion and contraction of adjacent materials, and sealant manufacturer's recommended joint design.
  6. Assemblies shall be free from rattles, wind whistles, and noise due to thermal and structural movement and wind pressure.
  7. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening, or fracturing connection between units and building structure or between units themselves.
  8. Do not assume glass, sealants, and interior finishes contribute to framing member strength, stiffness, or lateral stability.
  9. System shall drain to exterior face of wall; water entering system and condensation occurring within system by drain holes and gutters of adequate size to evacuate water without infiltration to interior.
  10. Provide components exposed to view uniform color and profile appearance.
  11. Do not design system to exceed sealant manufacturer's recommended performance criteria.

- D. Structural Requirements:
  - 1. Provide exterior envelope components engineered by registered professional engineers licensed to practice structural engineering in jurisdiction where Project is located where specified in individual specification sections.
  - 2. Anticipated building movement criteria: Refer to Structural General Notes on Structural Drawings.
- E. Wind Loading:
  - 1. Engineer typical exterior envelope to withstand positive and negative wind load acting normal to plane of walls as required by governing building code requirements using:
    - a. Basic wind speed: 120 mph
    - b. Exposure: B
    - c. Risk Category: IV.
  - 2. Engineer within 10 feet of corners and within 10 feet of parapet areas of exterior envelope to withstand upgraded wind requirements stipulated in ANSI A58.1 and ASCE 7.
- F. Thermal Requirements:
  - 1. Thermal movement:
    - a. Provide for expansion and contraction due to structural movement and temperature changes without detriment to appearance or performance.
    - b. Design for assumed temperature changes regardless of surface areas exposed to exterior and interior.
    - c. Design exterior envelope to withstand movement within itself, between wall assembly and structure in deflection, warpage and racking without breakage of air or water seals.
    - d. Provide joint movement capable of reacting to material temperature range of 180 degrees F.
  - 2. Assume entire cross section has uniform temperature.
  - 3. For thermal design other than joint movement, design winter surface temperature shall be 99 percent dry bulb winter temperature from ASHRAE handbook.
- G. Seismic Requirements
  - 1. Design for seismic loads and movement in accordance with applicable codes and following requirements.
  - 2. At any floor, assume that maximum seismic displacement for floor will occur while floor immediately above and below remain in undisplaced condition.
  - 3. Seismic displacements up to design seismic drift, no failure or gross permanent distortion of anchors, frames, glass, stone or panels will be allowed.
    - a. Glazing gaskets may not disengage.
    - b. Weather seals may not fail.
  - 4. Provide two times design seismic drift displacement or 3/4 inch, whichever is greater, no failure or gross permanent distortion of anchors, frames, glass, stone, or panel will be allowed.
    - a. Glazing gaskets may disengage.
    - b. Weather seals may fail.
  - 5. Engineer exterior envelope to accommodate seismic movements as established by 2006 Virginia Uniform Statewide Building Code.

#### 1.4 EXTERIOR GLAZING REQUIREMENTS

- A. Exterior Window Performance: Previously tested and successfully passed following:
  - 1. Air Infiltration of Fixed Units: Tested not to exceed 0.06 cubic foot/minute square foot in accordance with ASTM E283, at pressure differential of 6.24 PSF.
  - 2. Water Penetration Under Static Pressure: In accordance with ASTM E331; air pressure 20 percent design wind load; 8 PSF minimum, no uncontrolled water penetration allowed.
  - 3. Water Penetration Under Dynamic Pressure: In accordance with AAMA 501.1; air pressure 20 percent design wind load; 8 PSF minimum, no uncontrolled water penetration allowed.



4. Structural Test Under Uniform Static Pressure: Provide testing in accordance with ASTM E330.
  - a. Deflection under Uniform Loading: Limit deflection of aluminum members not to exceed  $L/175$  or maximum 3/4 inch for spans less than 13'-6". Limit deflection to  $L/240$  plus 1/4 inch for spans equal to or greater than 13'-6".
  - b. No glass breakage allowed.
  - c. Anchor movement not to exceed 1/8 inch.

#### **1.5 SUBMITTALS**

- A. Provide submittals in accordance with Section 013300.
- B. Provide test reports on accordance with Section 014000.
- C. Mock-up Coordination Drawings: Provide in accordance with Section 014000.

#### **1.6 FIELD TESTING**

- A. Hose Test:
  1. Perform field check for water leakage on actual building conforming to test requirements of AAMA 501.2.
  2. No water leakage will be permitted, as defined in this Section.
  3. Areas to be tested and number of tests will be determined by Owner including but not necessarily limited to one test at 10 percent, one test at 50 percent, and one test at 85 percent of completed curtain wall work.
  4. Test area: To be determined by Architect.
  5. Provide scaffold, hose, and water supply to perform tests, plus repeat unsuccessful tests after remedial work.
  6. Ensure remedial measures maintain standards of quality and durability of original design. Remedial measures are subject to approval of Architect.

### **PART 2 - PRODUCTS**

**NOT USED**

### **PART 3 - EXECUTION**

**NOT USED**

**END OF SECTION**



**SECTION 01 4500**  
**CONTRACTOR QUALITY CONTROL**

**PART 1 GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General Conditions and Supplemental Conditions, and other Division 01 Specification Sections, apply to this Section.
- B. Section 01 4000 Quality Requirements
- C. Section 01 4100 Air Barrier System
- D. Section 01 9113 General Commissioning Requirements.
- E. Section 22 0800 Plumbing Systems Commissioning
- F. Section 23 0800 Mechanical Systems Commissioning.
- G. Section 26 0800 Electrical Commissioning

**1.2 INTENT**

- A. The intent of Contractor Quality Control (CQC) is to positively control the quality of Work, including the work of subcontractors and suppliers, through preparatory, initial and follow-up activities to assure delivery of Work that meets requirements of the Contract Documents for performance, quality and timeliness.
- B. The Contractor shall execute a Contractor Quality Control program that meets the intent of CQC, using whatever manpower, time and resources are required, even where the quantity needed may exceed requirements of this Section or the approved CQC plan, at no additional cost to the Owner.
- C. This Section provides minimum requirements for documentation of the CQC program, such that the Owner may assure itself of quality and timely Work. The Owner will rely on documentation from the CQC program to satisfy some for the payment requirements of General Conditions of Contract Paragraph 13.2.2, which requires "sufficient data to demonstrate the Contractor's right to payment and compliance with the payment provisions of the Contract to the satisfaction of the Owner and the Architect/Engineer". In the absence of specified CQC documentation from the Contractor, the Owner reserves the right to withhold payment on undocumented work.

**1.3 RECOURSE**

- A. The Owner retains the right to the following actions in the event that the CQC fails to function in controlling the Work or fails to provide the visible quality control activities and documentation required:
  - 1. Changes to Staff and CQC Plan: The Owner reserves the right to require the Contractor to make changes in its CQC plan and operations including removal and replacement of personnel, as necessary, to obtain the quality specified.
  - 2. Contract Monitoring Report: The Owner may issue an unsatisfactory Contract Monitoring Report when the CQC documentation is inadequate or late and the Contractor has failed to correct the difficulty within 10 days of the original due date. The Contract Monitoring Report may prevent the Contractor from obtaining other Contracts from the Owner while unsatisfactory performance persists, and may lead to debarment of the Contractor from future bids.
  - 3. Notification of Noncompliance: The Owner's Project Manager or Construction Representative may notify the Contractor of any detected noncompliance with the Contractor Quality Control requirements. The Contractor shall, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor, will be deemed sufficient for the purpose of notification.

4. Withholding of Payments and Completion: Failure to meet CQC requirements and failure to correct noncompliance subjects the Contractor to withholding, reduction or rejection of payments, and refusal of Owner to accept completion.
5. Stop Work: If the Contractor fails or refuses to remedy construction deficiencies promptly such that the quality of ongoing Work cannot be assured, the Owner's Contract Administrator may issue an order stopping all or part of the Work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.
6. The Owner may conduct quarterly audits of the Contractor's CQC program to ensure full contract compliance. If Contractor's CQC program is found to be non-compliant, the Owner may take action up to and including issuing an order stopping all or part of the Work.

#### 1.4 DEFINITIONS AND ABBREVIATIONS

- A. CQC System: Contractor Quality Control System; the Contractor's management system to prepare, initiate and verify the quality of Work required by the Contract Documents.
- B. CPM: Critical Path Method; network scheduling method of describing the durations and interdependence of tasks of the Work, determining critical tasks that control the project completion time, and projecting the completion time of the Work.
- C. HVAC and Electrical Commissioning: The process of bringing the Heating, Ventilating and Air-conditioning system and electrical system of the Work to a state of being fully tested and performing in accordance with the Contract Documents, providing approved Operations & Maintenance manuals, and training the Owner's personnel to operate and maintain the system.
- D. Definable Feature of the Work: A definable feature of work is a task which is separate and distinct from other tasks and has separate control requirements. It could be identified as being performed by different trades or disciplines, or it could be work by the same trade in a different location. Although each section of the specifications may generally be considered as a definable feature of work, there is frequently more than one definable feature under a particular section.
- E. Thermal and Moisture Envelope: The exterior thermal and moisture barrier systems and components of the building and foundation, including all systems and materials to control the migration of heating and cooling energy out of the building through conductance or unwanted air transfer (infiltration). Major areas of quality control include, but are not limited to, the following:
  1. Sealant and transition joints between walls and floor or foundation, walls and roof, and at wall joints and corners;
  2. Application of waterproofing system and insulation at foundation (below grade);
  3. Application of wall and roof insulation;
  4. Application of roof membrane systems and accessories;
  5. Sealant joints and transition flashings around window and door frames, and other penetrations;
  6. Installation of air and vapor barrier systems;
  7. Verification that manufacturer's data on submittals meet specifications for thermal conductance, shading coefficient, and air leakage standards, permeability, and other specified requirements.

#### 1.5 PAYMENT

- A. All costs associated with CQC, including the cost of a full-time CQC Manager, must be included in the base bid.
- B. Monthly CQC reports by the Contractor are part of the "sufficient data to demonstrate the Contractor's right to payment ..." specified in General Conditions of Contract Paragraph 13.2.2. Therefore, failure to execute the CQC program or to submit adequate, timely and accurate monthly CQC reports as judged by the Owner may be cause for rejection of the Contractor's Application for Payment.

**PART 2 PRODUCTS****2.1 GENERAL**

- A. Software for Critical Path Method Schedules:
  - 1. Oracle Primavera P-6-or latest version.
- B. Submittals: Submit software manual with sample output forms for all required and proposed CQC reports with the CQC plan.
- C. Compact Diskettes (CDs): CDs containing all current Critical Path Method input and output files for the Work must be submitted with monthly CQC reports for progress payments. The CDs must be formatted as CD-ROM, 650 MB or higher, readable by most CD-ROM drives. Label CDs as follows:
  - 1. Project name.
  - 2. Project location.
  - 3. Contract number.
  - 4. Software and version.
  - 5. Unique Schedule Number
  - 6. List of all files.
- D. Paper Copies: Submit paper copies as specified in Division 01 "Construction Progress Documentation" and GCCC Article 11.2.2.

**PART 3 EXECUTION****3.1 GENERAL**

- A. The Contractor is responsible for quality control and shall establish and maintain an effective quality control system in compliance with the Contract Documents. The quality control system shall consist of plans, procedures, staff, and organization necessary to produce an end product which complies with the Contract Documents. The system shall cover all construction operations, both on-site and off-site, and must be keyed to the proposed construction sequence.

**3.2 CONTRACTOR'S QUALITY CONTROL PLAN**

- A. General: The Contractor must submit for approval by the Owner, not later than 30 days after receipt of Notice to Proceed, the Contractor Quality Control (CQC) Plan proposed to implement the requirements of Contractor Quality Control System. The plan must identify personnel, procedures, control, instructions, tests, records, and forms to be used.
- B. Content of the CQC Plan:
  - 1. The CQC plan prepared by the Contractor must include, as a minimum, the following to cover all construction operations, both on-site and off-site, including work by the Contractor, subcontractors, fabricators, suppliers and purchasing agents:
    - a. CQC Organization Description: A description of the quality control organization, including a chart showing lines of authority and acknowledgement that the CQC staff must implement the three phase control system for all aspects of the Work specified. The staff must include a CQC system manager who must report to the Principal of the Contractor's firm. The Principal in this context must mean the individual with responsibility for the overall management of the firm including quality and production.
    - b. Staff Summary: The name, qualifications (in resume format including employers, responsibilities and dates of employment over a minimum of the past ten (10) years), duties, responsibilities, and authorities of each person assigned a CQC function.
    - c. Letter of Authorization: A copy of the letter to the CQC Systems Manager signed by the Principal which describes the responsibilities and delegates sufficient authorities to adequately perform the functions of the CQC System Manager including authority to stop work which is not in compliance with the Contract. The CQC System Manager must

- issue letters of direction to all other quality control representatives specifying duties, authorities and responsibilities.
- d. Submittal Management Plan: Procedures for scheduling, reviewing, certifying, and managing all submittals. These procedures must be in accordance with Section 013305 "Submittals." A list of all required submittals with due dates and space for tracking return dates is required.
  - e. Contract Document Review Plan: The Contractor's procedures for performing constructability reviews of all elements of the Work and generating and tracking Requests for Information to the Architect/Engineer sufficiently in advance of the Work to allow adequate response time and avoid any delays in the Work. Fixed forms for submitting Requests for Clarification and tracking responses from the Architect/Engineer must be included.
  - f. Critical Path Control Plan: Initial CPM schedule for the project, including network chart, CDs with input files, and detailed task descriptions, together with procedures for tracking task progress required to update Critical Path Method (CPM) analysis and reports, and Contractor's management procedures for monitoring and alleviating potential time overruns as they develop during the Work.
  - g. List of Definable Features of Work: A list of definable features of work shall be submitted to the Owner prior to, and shall be reviewed during, the coordination meeting described in Paragraph 3.3 of this Section. The CPM plan and the list of definable features must be modified as applicable to include any additional features required by the Owner at no cost to the Owner.
  - h. Plan for Test Requirements: For each definable feature of work, list the test or standard of workmanship that defines quality (whether the testing is done by the Contractor or by other forces). Control, verification and acceptance testing procedures for each specific test must include the test name, Specification Section paragraph requiring test, feature of work to be tested, test frequency, and person responsible for each test.
  - i. Tracking Plan: Procedures for tracking preparatory, initial, and follow-up control phases and control, verifications, and acceptance tests including documentation.
  - j. Building Conditioning Plan: This plan shall include the detailed procedures to establish and maintain the required temperature and humidity to properly execute the Work.
  - k. Commissioning Program: Program for execution of Specification Section "Commissioning of HVAC System" and Specification Section "Commissioning of Electrical System" and the "Commissioning Plan". Commissioning program must include a task network presentation of the total commissioning process, including but not limited to: commissioning meetings, completion of major mechanical and electrical work, flushing of hydronic systems, equipment start-up, Test and Balancing process, required Maintenance orientations, inspection and accessibility reviews, Operating and Maintenance manual submittals and approvals, performance tests, training sessions, and final Commissioning Report. THE COMMISSIONING TASK NETWORK MUST BE EXPLICITLY INCLUDED IN THE CPM SCHEDULE, SHOWING CONDITIONAL LINKS TO (COMPLETION BEFORE) SUBSTANTIAL COMPLETION.
  - l. Deficiency Correction Tracking Plan: Contractor's procedures for tracking construction deficiencies from identification through acceptable corrective action. These procedures shall establish verification that identified deficiencies have been corrected.
  - m. Reporting Plan: Reporting procedures, including proposed reporting formats. The reporting plan will include at a minimum the following items:
    - 1) Daily QC reports typed and maintained in chronological order in a binder at the CQC system manager's office at the field site, with duplicates provided to the Owner's Construction Representative on a daily basis. Report content must be in accordance with Paragraph 3.9.B "Daily Records" in this Section.
    - 2) Daily briefing of the Owner's Construction Representative on CQC status, actions and plans.
    - 3) Monthly summary reports to be submitted with Application for Payment, including at a minimum; current CPM Schedule Update and Analysis of the Work, Deficiency

Tracking System report, Test Approval Log, and Submittal Tracking System report. The monthly summary report must provide information needed for the Architect/Engineer's Certification of the quality and timeliness of the Work. Report contents must be in accordance with Paragraph 3.9.C "Monthly Reports" of this Section. Monthly CQC reports are required to be submitted monthly even if the Contractor does not submit an Application for Payment.

2. The CQC plan shall include forms approved by the Owner for all the above functions.
  3. Reports which are incomplete, inaccurate, or inadequate as judged by the Architect/Engineer or Owner shall be cause for withholding payment under the Contract General Conditions.
- C. Acceptance of CQC Plan: Acceptance (approval) of the Contractor's plan or interim plan is required prior to the start of construction. Acceptance is conditional and will be predicated on satisfactory performance during the construction. The Owner reserves the right to require the Contractor to make changes in his CQC plan and operations including removal of personnel, as necessary, to obtain the quality specified.
- D. Notification of Changes: After acceptance by the Owner of the CQC plan, the Contractor must notify the Owner's Project Manager in writing a minimum of seven calendar days prior to any proposed change. Proposed changes are subject to acceptance by the Owner's Project Manager.

### 3.3 COORDINATION MEETING

- A. Before the start of construction, the Contractor shall submit a preliminary Contractor's Quality Control Plan. Subsequently, the Contractor shall meet with the Owner's Project Manager, with its Quality Control staff, and other team members, to discuss the Contractor's Quality Control System. Any submittals required for this meeting shall be submitted to the Owner at least one week in advance. During this coordination meeting, a mutual understanding of the system details for the Quality Control Plan shall be developed, including the forms for recording the CQC operations, definable features of the work, control activities, testing, administration of the Quality Control Plan for both on-site and off-site work, and the interrelationship of Contractor's and Owner's quality goals. After the meeting, the Contractor shall submit a formal Quality Control Plan, consistent with the results of the meeting, to the Owner for approval. The Contractor and its Quality Control staff shall also attend any subsequent conferences, as requested by the Owner, as may be required to address deficiencies in the CQC system.

### 3.4 CONTRACTOR'S QUALITY CONTROL ORGANIZATION

- A. CQC System Manager: The Contractor shall identify a qualified individual within his organization to be the CQC System Manager. The CQC System Manager shall be located at the site, will develop the CQC System, and will be responsible for overall management of CQC and have the authority to act in all CQC matters for the Contractor. This CQC System Manager shall be on the site at all times during construction, shall have no other duties, and shall be employed by the Contractor, except as noted in the following. An alternate CQC System Manager shall be identified in the plan to not exceed 2 weeks at any one time, and not more than 30 workdays during a calendar year. The requirements for the alternate CQC System Manager are the same as for the designated CQC System Manager. THE CQC SYSTEM MANAGER SHALL NOT BE THE CONTRACTOR'S SUPERINTENDENT ON THIS JOB OR BE ASSIGNED ANY OTHER DUTIES.
- B. CQC Organizational Staffing: The Contractor must provide a CQC staff with complete authority to take any action necessary to ensure compliance with the Contract.
- C. CQC Staff: Following are the minimum requirements for the CQC staff. These minimum requirements may not necessarily assure an adequate staff to meet the CQC requirements at all times during construction. The actual strength of the CQC staff may vary during any specific work period to cover the needs of the work period. When necessary for a proper CQC organization, the Contractor will add additional staff at no cost to the Owner. The following listing of minimum staff in no way relieves the Contractor of meeting the basic requirements of quality construction in accordance with Contract Documents. All CQC staff members shall be subject to acceptance by the Owner's Project Manager.

- D. CQC System Manager: The CQC System Manager shall be:
1. A graduate in construction management with an Associate's degree or higher, and;
  2. An experienced construction person with a minimum of 10 years' experience in construction management; 5 years of which must be in CQC, and;
  3. Shall be assigned no other duties on this or any other job; and
  4. Shall not be the Contractor's superintendent or Assistant (Deputy) Project Manager, or have any other role for this project.
- E. Supplemental Personnel: The Contractor must provide as part of the CQC organization, as a minimum, specialized personnel for the following areas:

Expertise	Education	Related Experience	Responsibilities
HVAC and Plumbing Quality Control	Associate degree or higher in mechanical engineering	5 years HVAC and Plumbing supervision experience and systems integration.	HVAC and Plumbing review for compliance with Contract Documents, quality, applicable codes and electronic system integration and coordination.
Electrical Quality Control	Associate degree or higher in electrical engineering	5 years electrical supervision experience and systems integration.	Electrical review for compliance with Contract Documents, quality, applicable codes and electronic system integration and coordination.
LEED Coordinator	LEED Accredited Professional	3 years LEED implementation experience of projects of similar scale and scope	Maintain all LEED and related documentation and oversee all construction activities to ensure compliance with project goals. May also serve as waste management coordinator.

1. These personnel shall assist and report to the CQC System Manager. Each person will be responsible for assuring the construction complies with the Contract Documents for their area of specialization. These individuals shall:
  - a. be employed by the Contractor or employed on a consultant basis, unless waived in writing by the Owner's Project Manager;
  - b. be responsible only to the CQC System Manager;
  - c. be physically present at the site during work on their areas of responsibility;
  - d. have the necessary education, training and experience to ensure Contract compliance; and
  - e. not be the employee of any of the subcontractors.
- F. A Commissioning Authority will be retained by the Owner. The CQC System Manager must work with the Commissioning Authority to provide all access, documents, information, subcontractor testing and involvement needed to successfully commission the facility systems.
- G. An ADA regulation compliance agent will be retained by the Owner. The CQC System Manager must work with the agent to provide all access, documents and information to verify compliance with ADA regulation.
- H. An Exterior Envelope Consultant will be retained by the Owner. The CQC System Manager must work with the agent to provide all access, documents, subcontractor testing and information to successfully commission the building envelope.



- I. Organizational Changes: The Contractor shall obtain the Architect/Engineer's and Owner's Project Manager's acceptance before replacing any member of the CQC staff. Requests for changing personnel shall include the names, qualifications, duties, and responsibilities of each proposed replacement.

### 3.5 SUBMITTALS

- A. Submittals shall be as specified in Division 1 Section "Submittals." The CQC Organization shall be responsible for verifying that each requirement of Contract Documents has been explicitly addressed in the submittal and must certify that all submittals are in compliance with the Contract Documents.

### 3.6 CONTROL

- A. Contractor Quality Control is the means by which the Contractor ensures that the Work complies with the Contract Documents. The controls shall cover all construction operations, including both on-site and off-site fabrication, and shall be keyed to the proposed construction sequence. The controls must include at least the following three phases of control to be conducted by the CQC System Manager for all definable features of work, as follows:
  1. Preparatory Phase: This phase shall be performed a minimum of 30 days prior to beginning work on each definable feature of work and shall include:
    - a. A check to ensure that the portion of the CQC System for the work to be performed has been accepted by the Owner.
    - b. A review of the Contract drawings, specifications and submittals by the CQC System Manager with the workers responsible for carrying out the construction.
    - c. A check to assure that all materials and/or equipment have been tested, submitted, and approved.
    - d. A check to assure that provisions have been made to provide required control inspection and testing.
    - e. Examination of the work area to assure that all required preliminary work has been completed and is in compliance with the Contract Documents.
    - f. A physical examination of required materials, equipment, and sample work to assure that they are on hand, conform to approved shop drawings or submitted data, and are properly stored.
    - g. Reviews to assure applicable safety requirements are met.
    - h. Discussion with workers and supervisors of procedures for constructing the Work including construction tolerances, environmental controls such as temperature and humidity and workmanship standards for that phase of work.
    - i. The Owner's Construction Representative must be notified at least 2 work days in advance of beginning any of the required action of the preparatory phase. This phase must include a preparatory meeting conducted by the CQC System Manager and attended by the superintendent, other CQC personnel (as applicable), and the foreman responsible for the definable feature. The results of the preparatory phase actions must be documented by separate minutes prepared by the CQC system manager and attached to the daily QC report. The Contractor must instruct applicable workers as to the acceptable level of workmanship required in order to meet Contract Documents.
  2. Initial Phase: This phase must be accomplished at the beginning of a definable feature of work. The following must be accomplished:
    - a. A check of preliminary work to ensure that it is in compliance with Contract Documents. Review minutes of the preparatory meeting.
    - b. Verification of full Contract compliance. Verify required control inspection and testing including environmental controls.
    - c. Establish level of workmanship and verify that it meets minimum acceptable workmanship standards. Compare with sample panels or mock-ups, as appropriate.
    - d. Resolve all differences.

- e. Check conditions to include compliance with applicable safety regulations. Review safety issues with each worker.
  - f. The Owner's Construction Representative must be notified at least 2 work days in advance of beginning the initial phase. Separate minutes of this phase must be prepared by the CQC System Manager and attached to the daily CQC report submitted to the Owner's Construction Representative. Exact location of initial phase must be indicated for future reference and comparison with follow-up phases.
  - g. The Initial phase should be repeated for each new crew to work on-site, or whenever quality standards are not being met.
3. Follow-up Phase: Daily checks shall be performed to assure continuing compliance with Contract requirements, including control testing, until completion of the particular feature of work. The checks shall be made a matter of record in the CQC daily report. Final follow-up checks must be conducted and all deficiencies corrected prior to the start of additional features of work which may be affected by any deficient work. The Contractor shall not build upon or conceal non-conforming work.
4. Additional Preparatory and Initial Phases: Additional preparatory and initial phases may be required to be conducted on the same definable features of work, as determined by the Owner's Construction Representative, if the quality of on-going work is unacceptable; or if there are changes in the applicable QC staff or in the on-site production supervision or work crew; or if work on a definable feature is resumed after a substantial period of inactivity, or if other problems develop.

### 3.7 TESTS

- A. Testing Procedure: The Contractor shall perform tests specified or required to verify that control measures are adequate to provide a product which conforms to Contract Documents. Testing includes operation, acceptance and/or performance tests when specified. Tests shall be documented in the test approval log. A list of tests shall be developed to include: the test name, entity contractually responsible for securing the testing, frequency, specification paragraph containing the test requirements, personnel and laboratory responsible for each type of test, and an estimate of the number of tests required. The Contractor shall perform the following activities and record and provide the following data:
  1. Verify that testing procedures comply with Contract Documents.
  2. Verify that facilities and testing equipment are available when needed for this Work and comply with testing standards.
  3. Check test instrument calibration data against certified standards.
  4. Verify that recording forms and test identification control number system, including all the test documentation requirements, have been prepared.
  5. Results of all tests taken, both passing and failing tests, shall be recorded on the Quality Control report for the date taken. Reference Specification paragraph, location where tests were taken, and the sequential control number identifying the test. If necessary, actual test reports may be submitted later, if approved by the Owner's Project Manager, with a reference to the test number and date taken. An informational copy of tests shall be provided directly to the Owner's Construction Representative. Failure to submit timely test reports, as stated, may result in nonpayment for related work performed and disapproval of testing agency/facility for this contract.

### 3.8 SUBSTANTIAL AND FINAL COMPLETION INSPECTIONS

- A. When the Contractor determines that the Work, or a designated portion thereof acceptable to the Owner, is Substantially Complete, the CQC System Manager shall conduct an inspection of the Work and develop a "punch list" of items which do not conform to the approved plans and specifications – including both uncompleted work and deficient work. This punch list of deficiencies, including the estimated date by which the deficiencies will be corrected, shall be included with the Contractor's request for Substantial Completion.

- B. When the Contractor determines that the Work, or a designated portion thereof acceptable to the Owner, has achieved final completion, the CQC System Manager shall conduct an inspection to ascertain that all deficiencies have been corrected and so notify the Owner in writing. These inspections and any deficiency corrections required by this paragraph shall be accomplished prior to Final Payment and within the time limits specified in the Contract Documents and the Certificate of Substantial Completion.

### 3.9 DOCUMENTATION

- A. All forms for documentation of CQC activities shall be submitted for approval by the Owner in the initial CQC Plan. The Owner may require use of its forms, or modifications to the Contractor's forms, at the Owner's discretion.
- B. Daily Records: The Contractor CQC shall maintain current daily records of quality control operations, activities, and tests performed, including the work of subcontractors and suppliers. These records shall be on an acceptable form and shall include factual evidence that required quality control activities and/or tests were performed, including but not limited to the following:
  - 1. Contractor/subcontractor and their area of responsibility.
  - 2. Operating plant/equipment with hours worked, idle, or down for repair.
  - 3. Work performed each day; provide location, description, and by whom. Identify each phase of work performed each day by CPM task name or activity number.
  - 4. Test and/or control activities performed with results and references to Contract Documents requirements. The control phase should be identified (Preparatory, Initial, Follow-up). List deficiencies noted along with corrective action.
  - 5. Material received with statement as to its acceptability and storage.
  - 6. Identify submittals reviewed, with contract reference, by whom, and action taken.
  - 7. Off-site surveillance activities, including actions taken.
  - 8. Job safety evaluations stating what was checked, results, and instructions or corrective actions.
  - 9. List instructions given/received and conflicts in Contract Documents.
  - 10. Contractor's verification statements.
  - 11. These records shall cover both conforming and deficient features and shall include a statement that equipment and materials incorporated in the work and workmanship comply with the Contract Documents. The original record shall be maintained by the Contractor on site in chronological order in a three-ringer binder. An electronic report form shall be furnished to the Owner's Construction Representative daily within 48 hours after the date(s) covered by the report via email and uploaded to Newforma Project Cloud. As a minimum, one report shall be prepared and submitted for every seven days of no work and on the last day of a no work period. All calendar days must be accounted for throughout the life of the contract. The first report following a day of no work shall be for that day only. Reports shall be signed and dated by the CQC System Manager. All reports from the CQC System Manager shall include copies of test reports and copies of reports prepared by subordinate quality control personnel.
- C. Monthly Reports: Contractor shall issue monthly reports summarizing activity, results, and status of the CQC program. Reports shall be in compliance with the approved CQC System and be typed, accurate and timely with two copies to be provided to the Owner, and one to the Architect/Engineer. Reports must cover the following minimum items, and any additional reports or data required by the Owner's Project Manager, at no additional cost the Owner:
  - 1. CPM Update and Analysis: Updated CPM analysis for the project to include, network analysis chart, current projected completion date, description of items on the critical path, management moves to prevent time overrun or recoup existing time overruns, analysis of items which could become critical path items if small delays occur.
  - 2. Deficiency Tracking System report: Summarize each deficiency tracked during the reporting month, including all new deficiencies observed, all prior deficiencies that have not been resolved, and management actions to resolve all deficiencies. Provide a separate listing of known work with unresolved deficiencies as of the report date.
  - 3. Test Approval Log: List all tests conducted during the reporting period and results.

4. Submittal Tracking System report: List the status of all submittals required on the project, including original deadline for submittal per approved CQC plan, each date of submittal or re-submittal, and final action date by the Architect/Engineer or current status.

### 3.10 COMMISSIONING FORMS

- A. Commissioning Forms: The Contractor's QC team shall complete required forms at each indicated phase and submit these forms with other required submittals.
- B. Other Forms: The Owner reserves the right to require specific additional or replacement QC forms provided by Owner to the Contractor, whenever the Owner believes such forms will permit better assurance of quality in the Work.

### 3.11 NOTIFICATION OF NONCOMPLIANCE

- A. The Owner's Project Manager or designee may notify the Contractor of any detected noncompliance with the foregoing requirements. The Contractor must, after receipt of such notice, immediately take corrective action. Such notice, when delivered to the Contractor shall be deemed sufficient for the purpose of notification. If the Contractor fails or refuses to comply promptly, the Owner's Contract Administrator may issue an order stopping all or part of the Work until satisfactory corrective action has been taken. No part of the time lost due to such stop orders shall be made the subject of claim for extension of time or for excess costs or damages by the Contractor.

### 3.12 OWNER AND ARCHITECT/ENGINEER REPORTING OF DEFICIENCIES

- A. The Owner, Architect/Engineer, and other design consultants will visit the site periodically and may issue field reports to the CQC System Manager. Any issues or deficiencies in the Work identified in any such field reports shall be recorded in the CQC Documentation and corrected as part of the CQC System.
- B. Progress meetings will be conducted regularly (typically every week) by the Architect/Engineer and shall be attended by the Owner, Contractor, CQC System Manager, and applicable sub-contractors. Any issues or deficiencies in the Work identified in these meetings shall be recorded in the CQC Documentation and corrected as part of the CQC System.

**END OF SECTION**

**SECTION 01 5000**  
**TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
- B. Related Sections include the following:
  - 1. Division 1 Section "Summary" for other work restrictions.
  - 2. Division 1 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
  - 3. Division 1 Section "Execution Requirements" for progress and final cleaning requirements.
  - 4. Division 1 Section "Indoor Air Quality (IAQ) Management" for procedures for protecting indoor air quality.
  - 5. Divisions 2 through 28 Sections for environmental (heat, ventilation, and humidity) requirements for products in those Sections.
  - 6. Division 31 Sections for disposal of ground water at Project site.

**1.3 DEFINITIONS**

- A. Permanent Enclosure: As determined by Architect/Engineer, permanent or temporary roofing is complete, insulated, and weathertight; exterior walls are insulated and weathertight; and all openings are closed with permanent construction or substantial temporary closures.

**1.4 USE CHARGES**

- A. General: All costs or use charges for temporary facilities, including equipment startup, testing and commissioning shall be included in the Contract Sum. Allow other entities to use temporary services and facilities for project use without cost, including, but not limited to, Owner, Owner 3<sup>rd</sup> Party Contractors, Architect/Engineer, Commissioning Authority, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Pay sewer service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Pay water service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations.

**1.5 SUBMITTALS**

- A. LEED Submittal (if permanent HVAC used during construction):
  - 1. Product data for Credit IEQ 3.1: For filter media installed during construction and prior to occupancy, documentation indicating MERV rating.
- B. Site Plan: Show temporary facilities, utility hookups, staging areas, project identification sign, and parking areas for construction personnel.
- C. Project Identification Sign: Submit shop drawings for approval showing plan elevation, details and finishes for Project Identification Sign.

## 1.6 QUALITY ASSURANCE

- A. Electric Service: Comply with NECA, NEMA, and UL standards and regulations for temporary electric service. Install service to comply with NFPA 70.
- B. Tests and Inspections: Arrange for authorities having jurisdiction to test and inspect each temporary utility before use. Obtain required certifications and permits.

## 1.7 TEMPORARY USE OF PERMANENT FACILITIES

- A. Contractor must obtain prior written Owner approval before using any permanent facility, system or service not specified on the Contract Documents. The Owner's approval of Contractor request for use of permanent facilities, system or services shall be totally at the Owner's discretion.
- B. Contractor shall be responsible for operation, maintenance, protection and restoration of each permanent facility, system or service during its use as a construction facility before Substantial Completion, regardless of Owner's approval of use. If used by Contractor, Contractor shall return permanent facility, system and services to "like new" condition prior to turnover to the Owner at Substantial Completion; this includes but is not limited to cleaning, replacement of filters, replacement of burnt out lamps and replacement of worn parts. Warranties for all permanent facilities, systems and services shall start at Substantial Completion regardless of any prior use by the Contractor.
- C. Contractor shall be responsible for operation, maintenance, protection and restoration of each permanent facility, system or service during its use by the Owner before Substantial Completion, as per the phasing indicated in the contract documents. Contractor shall return permanent facility, system and services to "like new" condition prior to turnover to the Owner at Substantial Completion. This includes but is not limited to cleaning, replacement of filters, replacement of burnt out lamps and replacement of worn parts. Warranties for all permanent facilities, systems and services shall start at Substantial Completion regardless of any prior use by the Owner or the Contractor.

# PART 2 PRODUCTS

## 2.1 MATERIALS

- A. Portable Chain-Link (Site Enclosure) Fencing: Minimum 2-inch, 9-gage, galvanized steel, chain-link fabric fencing; minimum 8 feet high with galvanized steel pipe posts; minimum 2-3/8 inch OD line posts and 2-7/8 inch OD corner and pull posts, with 1-5/8 inch OD top and bottom rails. Provide concrete bases for supporting posts.
- B. Lumber and Plywood: Unless noted otherwise, comply with requirements in Division 6 Section "Miscellaneous Carpentry."
- C. Paint: Comply with requirements in Division 9 painting Sections.

## 2.2 TEMPORARY FACILITIES

- A. General: Maintain all temporary facilities and controls necessary for the performance of the Work. Comply with all applicable codes and regulations of authorities having jurisdiction; obtain permits as required. Locate and install all facilities and controls where acceptable to the local authorities having jurisdiction, utility, and Owner and remove same and terminate, in a manner suitable to the utility owner, at completion of the Work or when otherwise directed. Pay all costs associated with the provision and maintenance of temporary facilities and controls including power, water, and fuel (if any) consumed until Substantial Completion.
- B. Field Offices, Contractor: Provide prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading; of sufficient size to accommodate needs of construction personnel. Provide at time of project mobilization. Keep office clean and orderly. Field office shall include the following:

1. Conference room or area of sufficient size to accommodate meetings of 20 individuals. Furnish room with conference table, chairs, and 4-foot- square tack board.
  2. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
  3. Lighting fixtures capable of maintaining average illumination of 20 foot-candles at desk height.
- C. Field Office, Owner: Provide prefabricated or mobile unit with serviceable finishes, weather-tightness, ventilation, temperature controls, and foundations adequate for normal loading; of sufficient size to accommodate needs of Owner personnel. Provide at time of project mobilization. Keep Owner's office clean and orderly; provide for weekly trash removal and cleaning. Provide security for trailer. Owner's Field office shall include the following:
1. Trailer shall be provided with two (2) private offices, one (1) of which shall be lockable with a common conference area. Each office shall have an office desk, office chair, small reference table, a tack board and a 4-drawer lateral filing cabinet (42" wide). The common area shall have a conference table large enough for 16 people and 16 folding chairs as well as a drafting table.
  2. Drawing "hanger" system of sufficient size to hold all Contract Drawings and Shop Drawings.
  3. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
  4. Lighting fixtures capable of maintaining average illumination of 20 foot-candles at desk height.
  5. Provide temporary toilets, wash facilities, coffee maker, minimum 15 cu. ft. refrigerator, microwave oven and drinking water for use of Owner personnel.
  6. Provide temporary telephone service. Contractor shall install one telephone line in the conference area for a poly-com type telephone/equipment and an additional dedicated telephone line for a facsimile machine. Provide dedicated high-speed wireless hotspot for County's use.
  7. Sufficient electrical outlets.
  8. Provide a secure, lockable closet for Owner's third party testing agency to store their testing equipment.
  9. Contractor to provide cleaning services a minimum of two (2) times weekly.
  10. Contractor to provide twelve (12) hard hats, vests and goggles for use by visitors to the site.
  11. Contractor to provide office copier/scanner/fax and paper for printing.
- D. Storage and Fabrication Sheds: Provide weather-tight sheds sized, furnished, and equipped to accommodate tools, materials and equipment for construction operations.
1. Store combustible materials apart from building.
  2. Provide sheds sized to storage requirements for products of individual Sections, allowing for access and orderly maintenance and inspection of products.
- E. Storage and Staging Areas: The Contractor shall be responsible for coordination, protection and safekeeping of products stored on site under this Contract including soil cut and fill. Refer to Contract Documents for any defined staging areas.
1. Move stored products that interfere with construction of the Work, or operations of the Owner or separate contractors.
  2. Obtain and pay for use of additional storage or staging areas as needed for the Work.
  3. Provide storage areas sized to storage requirements for products of individual Sections, allowing for access and orderly maintenance and inspection of products.

## 2.3 EQUIPMENT

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

- B. Heating Equipment: Unless Owner authorizes use of permanent heating system, provide UL Listed or FM approved 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 testing agency acceptable to authorities having jurisdiction, and marked for intended use.
  3. If Owner authorizes use of permanent heating system, protect indoor air quality in accordance with Division 1 "Indoor Air Quality Management", including but not limited to the following measures:
    - a. Filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 must be used at each return air grill, as determined by ASHRAE 52.2-1999, and all HVAC systems, equipment and pathways shall be dust and particulate free at the time of substantial completion of that phase of construction, in accordance with SMACNA "IAQ Guidelines for Occupied Buildings Under Construction."
      - 1) Replace filters during construction as necessary to protect equipment and indoor air quality.
    - b. HVAC supply and return ductwork, registers and equipment shall be kept clean, free of dust, debris, moisture, gaseous and microbial contamination during storage, handling installation and punch-out.
    - c. During the progress of construction, install new filtration media throughout the HVAC system. Filtration media shall have a Minimum Efficiency Reporting Value (MERV) of 8 or better, dependent upon equipment and designed static pressure limitations, as determined by ASHRAE 52.2-1999.

## **PART 3 EXECUTION**

### **3.1 INSTALLATION, GENERAL**

- A. Locate temporary 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.
- B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.
- C. Location of Contractor's and Owner's field trailers shall be approved by Owner prior to installation.

### **3.2 TEMPORARY UTILITY INSTALLATION**

- A. Owner will pay all monthly utility bills for services for which they currently have an account. Any new or temporary account or connections or hook-up costs will be the responsibility of the contractor.
- B. Contractor shall provide and pay for all temporary utility service and systems as needed for the efficient construction of the facility until Substantial Completion.
  1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
  2. Contractor is solely responsible for cost of, the coordination with the utilities for, and the timeliness of, the installation of temporary utilities until Substantial Completion. The Owner does not guarantee the availability of temporary utilities at the site, and does not guarantee the timing of permanent utility installation. The Contractor shall verify the availability of temporary utilities prior to bid and shall arrange for, and pay for, all utility permits, inspections, connections, etc. necessary for provision of temporary utilities. No time extension will be granted based on the Contractor's failure to obtain temporary utilities in time to support completion of the project.



- C. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
  - 1. Existing sanitary/septic system may be used during the course of construction until construction/demolition activities render the system unusable.
- D. Water Service: Install temporary water service and distribution piping in sizes and pressures adequate for construction.
  - 1. Existing well may be used during the course of construction until construction/demolition activities render the system unusable. Contractor is responsible for bringing water on site as required after the well is abandoned or if the well cannot produce adequate flow to support construction activities.
  - 2. Wash Facilities: Supply with potable water for personnel to wash-up for sanitary condition. Dispose of drainage properly. Provide cleaning compounds appropriate for each condition.
  - 3. Extend branch piping with outlets located so water is available by hoses with threaded connections. Provide temporary pipe insulation as required to prevent freezing.
  - 4. Remove all temporary piping and connections after use is no longer required.
- E. Sanitary Facilities: Provide temporary self-ventilated portable toilets for use by all construction personnel throughout the construction period. Keep toilet facilities clean, sanitary, provided with all appurtenances and in compliance with applicable codes and regulations. Service as often as necessary to prevent accumulation of wastes and creation of unsanitary conditions. Remove at Substantial Completion.
- F. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.
  - 1. Within 30 calendar days of Notice-to-Proceed 1 (NTP-1), Contractor shall submit in writing to the Architect/Engineer and Owner, for review only, three copies of its method and time schedule for heating during construction, which shall concur with its general progress schedule.
  - 2. After the building or portion thereof is completely enclosed by either permanent construction or substantial temporary materials, and before installation of finishes, Contractor shall pay for and provide heating or cooling therein of not less than 55 degrees F., or more than 75 degrees F. with a relative humidity as required by the manufacturers of the finishing items, which shall be continuously maintained in the enclosed area until the project is accepted. This temperature/humidity range shall be established and implemented not less than 45 days prior to installation of interior finishes, i.e. dry wall, mill work, flooring, paint, tile, etc.
  - 3. Contractor shall provide one accurate recording Fahrenheit thermometer at a place designated by Owner's Construction Representative, and one additional accurate thermometer for every 2,000 square feet of floor space, located as directed by Owner's Construction Representative in order to determine if the specified temperatures are maintained. Contractor shall furnish daily to the Owner's Construction Representative three copies of a signed statement of temperatures recorded every three hours.
  - 4. Contractor, with the written approval of the Owner, may use the permanent heating and cooling systems as specified for the project once it has been tested, flushed out and chemically treated, and is ready to operate. Contractor shall pay all energy costs for heating and cooling during construction and provide meters if required. Contractor shall coordinate the work so that the permanent heating and cooling systems for the building will be available and ready to provide heat as soon as the building is closed in.
  - 5. Contractor shall arrange and pay for operation of the heating and cooling systems including all costs to put in first-class condition all portions of the permanent heating and cooling systems used for heating during construction prior to turnover and acceptance by Owner.
  - 6. The installation and operation of heating devices shall comply with all safety regulations including provisions for adequate ventilation and fire protection. Heating devices, which may cause damage to finish surfaces, shall not be used.

7. Prior to operation of permanent equipment for temporary heating purposes, verify that installation is approved for operation, equipment is lubricated, and filters are in place. Provide and pay for operation, maintenance, and regular replacement of filters and worn or consumed parts.
- G. Temporary Ventilation: Provide adequate ventilation in enclosed areas throughout construction period required to: facilitate progress of Work; to protect Work and products against excessive dampness and heat; to prevent moisture condensation on surfaces; to provide suitable environmental conditions for installation and curing of finish materials; to provide adequate ventilating to meet health regulations for safe working environment; and, to prevent hazardous accumulations of dusts, fumes, mists, vapors or gases in areas occupied during construction. Provide local exhaust ventilating to prevent harmful dispersal of hazardous substances into atmosphere of occupied areas. Dispose of exhaust materials in manner that will not result in harmful exposure to persons or property. Provide ventilating operations at all times personnel occupy an area subject to hazardous accumulations of harmful elements. Continue operation of ventilating system for as long as required after cessation of construction activities to assure removal of harmful elements.
- H. Electric Power Service: Provide electric power service and distribution system (meeting NEC requirements) of sufficient size, capacity, and power characteristics required for efficient construction operations.
  1. Equip service with meter, main disconnect, and over current protection.
  2. Provide branch distribution system from temporary power source with distribution boxes and outlets located so that power is available throughout active work areas.
  3. Permanent receptacles may be utilized during construction. Replace any receptacle plates and wiring devices damaged during construction.
  4. Remove all temporary wiring after it use is no longer required. Restore source of power to its pre-construction condition.
- I. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, safety and traffic conditions.
  1. Install and operate temporary lighting that fulfills security and protection requirements.
  2. Provide branch distribution system from temporary power source with distribution boxes and outlets located so that lighting is available throughout active work areas.
  3. Provide 1 watt per sq. ft. lighting to exterior staging and storage areas after dark for security purposes. Provide 0.25 watt per sq. ft. lighting to interior work areas after dark for security purposes. Provide a lighting level of 150 foot-candles per sq. ft. minimum on surfaces receiving finishes.
  4. Permanent lighting system may be utilized during construction with Owner approval. Restore permanent lighting systems used during construction to original condition. Maintain lighting and provide routine repairs.
- J. Telecommunications Service: Provide and pay for all costs (including installation, maintenance and monthly service costs) for telecommunications systems for the performance of the Work and for the Owner's trailer.
  1. Provide temporary telephone service in the field offices for use by construction and Owner personnel. Install one telephone line for each field office.
  2. Provide additional telephone lines for the following:
    - a. Provide a dedicated telephone line for each facsimile machine and computer in each field office.
    - b. Provide a telephone line at each first-aid station.
  3. Provide Contractor superintendent with a cellular telephone for use when away from field office.
  4. Provide dedicated high speed (T-1 or cable internet service) lines in Contractor's field office for computer (e-mail and internet) use.
  5. Provide dedicated high speed (T-1 or cable internet service) lines in Owner's field office for computer (e-mail and internet) use.

- K. Electronic Communication Service: Provide temporary electronic communication service, including electronic mail, in common-use facilities.

### 3.3 SUPPORT FACILITIES AND CONTROLS

- A. General: Comply with the following:
1. Provide incombustible construction for offices, shops, and sheds located within construction area or within 30 feet of building lines. Comply with NFPA 241.
  2. Maintain support facilities until near Substantial Completion. Remove before Substantial Completion after approval by Owner. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions approved by Owner.
- B. Traffic Controls: Comply with requirements of authorities having jurisdiction prior to any work affecting public roads, sidewalks or other public right-of-ways.
1. Maintain traffic on all streets adjacent to or leading to the site. Where construction operations interfere with the free movement of traffic, provide approved traffic controls, flagmen or similar devices to efficiently control traffic movement. With prior approval, provide detours as necessary for unimpeded traffic flow. Comply with approved traffic management plans when provided.
  2. Protect existing site improvements including curbs, pavement, sidewalks and utilities. Keep streets, drives, and walks adjacent to site and haul routes clean and free of dirt, debris, and litter caused by construction operations.
  3. Provide means of removing mud and debris from vehicle wheels before entering public streets. Clean mud and debris from public streets and sidewalks as required.
  4. Track-equipped vehicles are not allowed on paved areas.
  5. Maintain access for fire-fighting equipment and access to fire hydrants at all times.
  6. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Haul Routes:
1. Consult with authorities having jurisdiction to establish public thoroughfares allowed to be used for haul routes and site access.
  2. Confine construction traffic to approved haul routes at approved hours.
  3. As required, provide traffic control at critical areas of haul routes to regulate traffic, to minimize interference with public traffic.
- D. Maintenance of Access: Contractor shall provide and maintain until Substantial Completion, means of safe access to, around and within the site, for vehicular and personnel traffic.
1. Provide and maintain means of access (including access roads, construction personnel parking area and walkways) constructed to sustain the weight and easy movement of construction personnel and equipment used in construction of the Work.
  2. Provide and maintain means of access constructed to sustain the weight and easy movement of any Emergency vehicle required by governing authority. Provide and maintain access to site fire hydrants, free of obstructions, at all times.
  3. Contractor shall, without additional compensation from Owner, furnish labor and materials necessary to repair and maintain the means of access in an acceptable condition to meet performance requirements.
  4. Remove all snow and ice in an expeditious manner to protect and prosecute the Work.
- E. Temporary Signs: Provide temporary signs where needed to inform public and individuals seeking entrance to Project. Unauthorized signs are not permitted.
1. Provide temporary, directional signs for construction personnel and visitors.
  2. Maintain and touchup signs so they are legible at all times.
- F. Project Identification Sign: Contractor shall furnish and install one project sign as indicated below and as approved by Owner within thirty days of commencement of construction:
1. Owner will provide (See attached for) sample layout for project identification sign.
  2. Sign shall be installed near the project entrance at a location of high visibility approved by Architect/Engineer and Owner.

3. Sign shall be installed and maintained plumb and level.
  4. Sign shall be fabricated from one-inch thick medium density overlaid exterior plywood laminated with waterproof glue. All edges of sign shall be banded with 1 inch by ½-inch pine banding. All nails, nuts, bolts and other connecting hardware shall be galvanized.
  5. Sign shall be supported by two 4" by 4" structural wood post supports set in 12 inch diameter concrete footings to a depth of four feet and so that sign is raised a minimum of four feet above grade.
  6. Sign shall be lettered by a professional sign painter with use of graphics in accordance with the general layout indicated. Submit shop drawing indicating sign construction and lettering.
  7. Letter style shall be Helvetica Medium. Letter color shall be gloss white. All surfaces of sign shall receive one coat exterior primer followed by two coats of exterior gloss enamel. Surface color shall be Dark Blue --Sherwin Williams 33-24 or equal.
  8. Contractor shall repair any deterioration or damage to the sign during the construction.
  9. At completion of the project, Contractor is responsible to remove and dispose of the sign, supports and foundations and to restore area.
  10. No other free-standing signs will be allowed except those required by law. All other contractor signage shall be trailed mounted; subject to Owner's approval. Subcontractor trade signs are not permitted.
- G. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction and the requirements of other Sections. Maintain the Project site, excavations, and construction free of water from rain or snow, spring or ground water, backing up of drains, and other water sources.
1. Dispose of water in a lawful manner that will not result in flooding Project site or adjoining properties nor endanger permanent Work or temporary facilities.
  2. Remove snow and ice as required to minimize accumulations and to protect the Work.
  3. As necessary, provide and operate sufficient dewatering and pumping equipment to maintain the site and the Work free of standing water.
- H. Waste Disposal Facilities: Comply with requirements specified in Division 1 Section "Construction Waste Management."
- I. Lifts and Hoists: Furnish and maintain hoists, staging, rigging, scaffolding, and runways required in the execution of the work. Erect, equip, and maintain such temporary work in accordance with statutes, laws, ordinances, rules, and regulations of the governing authorities and insurance companies having jurisdiction.
1. Truck cranes and similar devices used for hoisting materials are considered "tools and equipment" and not temporary facilities.
- J. Temporary Elevator Use: The elevators constructed under the requirements of Division 14 shall only be used for construction purposes, or during the construction period, with written permission from the Owner, in which case such use shall be limited to a single car. Elevators may be used by the Contractor as necessary for testing and inspection only without Owner approval. Temporary enclosures or hoistway opening protection, cab finish protection (protective padding), protection of damage to car, door and door frames, hoisting machine, platforms, etc shall be provided by the Contractor. Any repairs, or replacements, required to restore the elevator equipment to its original, like new, condition shall be made by the Contractor at his own expense prior to Substantial Completion. Owner is not responsible for providing telephone service for elevator use during construction.
- K. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.
- L. Temporary Use of Permanent Stairs: Cover finished permanent stairs with protective covering of plywood or similar material so finishes will be undamaged at time of Substantial Completion.
- M. Design of Temporary Structures: The structural design and permitting of all items used in the construction of the building and not a permanent part thereof, including but not necessarily limited to hoisting towers, shoring for concrete and masonry work, the temporary bracing for

structural steel, and the sheeting/shoring of cut earth banks, is the sole responsibility of the Contractor.

### 3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Comply with permit requirements and authorities having jurisdiction. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that prevent air, water, and soil contamination or pollution or other undesirable effects.
- B. Tree and Plant Protection: Comply with contract requirements, permit requirements and authorities having jurisdiction. As a minimum:
  - 1. Preserve and protect existing trees and plants designated to remain.
  - 2. Provide 6 foot high barriers around drip line, with access for maintenance.
  - 3. Consult with Architect/Engineer; remove agreed-on roots and branches which interfere with construction.
  - 4. Protect areas within drip lines from traffic, parking, storage, dumping, chemically injurious materials and liquids, ponding, and continuous running water.
  - 5. Replace trees and plants damaged by construction operations.
- C. Temporary Erosion and Sedimentation Control: Comply with permit requirements and authorities having jurisdiction. Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to adjacent properties and walkways, according to requirements of authorities having jurisdiction.
  - 1. Inspect, repair, and maintain erosion-control and sedimentation-control measures during construction until pavement has been installed.
  - 2. Plan and execute construction by methods to control surface drainage from cuts and fills, from borrow, and from waste disposal areas. Prevent erosion and sedimentation.
  - 3. Minimize amount of bare soil exposed at one time.
  - 4. Provide temporary measures such as berms, dikes, silt fences, drains, and other soil and erosion control devices required by authorities having jurisdiction.
  - 5. Construct fill and waste areas by selective placement to avoid erosive surface silts or clays.
  - 6. Periodically inspect earthwork to detect evidence of erosion and sedimentation; promptly apply corrective measures.
- D. Stormwater Control: Comply with permit requirements and authorities having jurisdiction. Provide methods to control surface water to prevent damage to site or adjoining properties. Maintain excavations free of water; provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater. Grade site to drain; protect site from ponding water. Where required, provide, operate, and maintain pumping and dewatering equipment. Provide water barriers required to protect site from soil erosion.
- E. Dust Control: Execute Work by methods that minimize raising dust from construction operations. Provide positive and effective means of dust control both within the building and on the surrounding site. Contractor shall apply water and/or use other methods acceptable to Owner to minimize dust in the air. Comply with requirements of governing agencies.
- F. Noise Control: Perform all work within the time limits and requirements imposed by the authorities having jurisdiction. Develop and maintain a noise-abatement program and enforce strict discipline over all personnel to keep noise to a minimum within the limits.
- G. Pest Control: Engage a pest-control service to minimize attraction and harboring of rodents, roaches, insects and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.
- H. Site Enclosure Fence: Before construction operations begin, provide and erect specified site enclosure fence in a manner that will prevent people and animals from entering construction site except by entrance gates.

1. Extent of Fence: As noted on construction drawings or, if not noted, as required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
  2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide one key to Owner's Construction Representative.
  3. Construction fence shall be of chain link or other Owner-approved construction, erected in a substantial manner, straight, plumb and true.
  4. Gates shall be built into fence at such approved locations as are necessary, be well cross-braced and hung on heavy strap hinges with proper post and hook for double gates. Provide heavy hasps and padlocks for each gate.
  5. Maintain the fence and gates in good condition for the duration of the construction operations and then remove them completely from the site, unless otherwise directed by the Owner.
  6. Restore site to original condition after removing fence.
- I. Security: Provide adequate security and lighting devices to prevent unauthorized entrance, vandalism, theft, use, and similar violations of security to Work and existing facilities. Install substantial temporary enclosure around partially completed areas of construction including all exterior openings. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security; lock entrances at the end of each workday. Coordinate with Owner's security program to prevent security violations.
- J. Protection of Installed Work: Protect installed Work and provide special protection where specified in individual Specification Sections.
1. Provide temporary and removable protection for installed Products. Control activity in immediate work area to minimize damage.
  2. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
  3. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials compatible with material being protected.
  4. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer. During the construction period after the installation of the roofing system, Contractor shall be responsible for damages to the roof caused by work or materials of the other trades.
  5. Prohibit traffic at landscaped areas.
- K. Protective Barriers: Provide barriers to protect existing facilities, the Work and adjacent properties from damage from demolition and construction operations. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing facilities. Provide protective barriers to protect plant life designated to remain. Protect vehicles, stored material and structures from damage.
- L. Safety: Provide safety protection to all machinery, equipment, and temporary and permanent facility hazards to prevent unsafe conditions and to comply with the safety requirements of the authorities having jurisdiction, OSHA and MOSHA.
1. Protect all hazards with adequately constructed guardrails, fences or barricades and provide warning signs, lanterns, warning lights, and the like, as necessary to prevent unsafe access. To this end, dispose, store, guard, and protect the premises and all Work, materials, equipment and both permanent and temporary construction so as to preclude the unauthorized use thereof and particularly to eliminate possible consequent injury to all persons.
  2. Institute and maintain a safety program for worker safety at the site.
  3. Do not load or permit any part of the Work to be loaded so as to endanger its safety.
  4. At completion of the Work, all temporary security, safety, construction aids and protections shall be removed.
- M. Existing Underground Utilities: Comply with all laws and regulations concerning the identification and locations of all underground utilities. Utilities data on Drawings are based

upon information obtained by Architect/Engineer and have not been verified by Architect/Engineer. Architect/Engineer and Owner are not be responsible or liable for accuracy of the data supplied. Data shall not be relied upon by Contractor in complying with Contract Documents or safety requirements. Report to the utility any break, leak, dent, gouge, groove, or any other damage to facilities whether or not caused by the Contractor. Contractor shall notify Owner, Architect/Engineer and nearby occupants of any emergency situations that may arise.

- N. Temporary Enclosures: Provide temporary weather-tight enclosures and temporary heating for protection of the Work in progress and completed, from exposure (freezing or frost damage), foul weather, other construction operations, and similar activities as required by Contract Documents. Provide temporary weathertight enclosure for building exterior as needed to maintain acceptable working conditions and to maintain specified environmental controls for product installation.
  - 1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.
  - 2. Provide protection as necessary to ensure adequate working areas during the months that temperature drops below 40 degrees F. Protection shall be consistent with the approved construction schedule to permit the continuous progress of all work necessary to maintain an orderly and efficient sequence of construction operations.
  - 3. Provide all "weather protection" material and be responsible for all costs, including for required heating to maintain a minimum temperature of 40 degrees F (see specific Sections for stricter environmental controls for some materials), at the working surface.
  - 4. See elsewhere in this Section for temporary heating requirements.
- O. Fire Exits: Maintain, for the entire length of the Work, all required exits to conform with regulations of authorities having jurisdiction
- P. Temporary Fire Protection: Provide fire protection and prevention in accordance with all applicable Federal, State and local codes and regulations and authorities having jurisdiction. Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
  - 1. Develop and supervise an overall fire-prevention and fire-protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct construction personnel in methods and procedures. Post warnings and information.
  - 2. Prohibit smoking in hazardous fire-exposure areas.
  - 3. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
  - 4. All flammable liquid and material shall be properly stored in UL listed containers, properly handled, and kept to an absolute minimum at the site.
  - 5. Provide temporary standpipes and hoses as necessary 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.
  - 6. Provide and maintain fire extinguishers, and other fire-fighting equipment, as required by locations and classes of fire exposures.

### 3.5 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 meet specification requirements, 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 unless authorized in writing by the Owner.

- D. Termination and Removal: Remove each temporary facility, utility, equipment, material or control when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than request for Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed or damaged because of interference with temporary facility. Repair damaged Work or existing facilities, clean exposed contaminated surfaces, and replace damaged construction that cannot be satisfactorily repaired or cleaned.
1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
  2. At Substantial Completion, clean and restore permanent facilities and equipment used during construction period to original condition. Comply with final cleaning requirements specified in separate Division 1 Section.

### 3.6 SAMPLE SIGN FOLLOWS THIS SECTION

**END OF SECTION**



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**Montgomery County Maryland**  
**Isiah Leggett, County Executive**

**Kensington Fire Station 25**

**Montgomery County Fire & Rescue**

Council member name  
Council member name  
Council member name  
Council member name  
Council member name

Council member name  
Council member name  
Council member name  
Council member name  
Council member name

Manager:  
**Department of General Services**  
**Division of Building Design and Construction**  
240-777-6034

Architect:  
The Hughes Group  
22630 Davis Drive, Suite 175  
Sterling, VA 20164

Contractor:  
xxxxxxx  
xxxxxxx  
xxxxxxxxx

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White text on blue background

4'-0"



**SECTION 01 5721**  
**INDOOR AIR QUALITY CONTROLS**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Construction procedures to promote adequate indoor air quality during and after construction.
- B. Building flush-out after construction and before occupancy.
- C. Testing indoor air quality after completion of construction.

**1.2 PROJECT GOALS**

- A. See Section 01 3515 - LEED Certification Procedures, for overall project goals relating to environment and energy.
- B. Dust and Airborne Particulates: Prevent deposition of dust and other particulates in HVAC ducts and equipment.
  - 1. Cleaning of ductwork is not contemplated under this Contract.
  - 2. Contractor shall bear the cost of cleaning required due to failure to protect ducts and equipment from construction dust.
- C. Airborne Contaminants: Procedures and products have been specified to minimize indoor air pollutants.
  - 1. Furnish products meeting the specifications.
  - 2. Avoid construction practices that could result in contamination of installed products leading to indoor air pollution.
- D. Ventilation: HVAC system has been designed to achieve the minimum requirements for ventilation specified in ASHRAE 62.1.

**1.3 REFERENCE STANDARDS**

- A. ASHRAE Std 62.1 - Ventilation for Acceptable Indoor Air Quality.
- B. SMACNA (OCC) - IAQ Guideline for Occupied Buildings Under Construction.

**1.4 DEFINITIONS**

- A. Adsorptive Materials: Gypsum board, acoustical ceiling tile and panels, carpet and carpet tile, fabrics, fibrous insulation, and other similar products.
- B. Contaminants: Gases, vapors, regulated pollutants, airborne mold and mildew, and the like, as specified.
- C. Particulates: Dust, dirt, and other airborne solid matter.
- D. Wet Work: Concrete, plaster, coatings, and other products that emit water vapor or volatile organic compounds during installation, drying, or curing.
- E. Ventilation: The process of supplying and removing air to and from interior spaces by natural or mechanical means.
- F. Volatile Organic Compound (VOC): Carbon compounds that participate in atmospheric photochemical reactions, (excluding carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonates, and ammonium carbonate); the compounds vaporize (become a gas) at normal room temperatures.

**1.5 SUBMITTALS**

- A. LEED Submittals: Submit all submittals required in this section in accordance with procedures specified in Section 01 3515.

- B. Indoor Air Quality Management Plan: Describe in detail measures to be taken to promote adequate indoor air quality upon completion; use SMACNA IAQ Guidelines for Occupied Buildings Under Construction as a guide.
  - 1. Submit not less than 90 days before enclosure of building.
  - 2. Identify potential sources of odor and dust.
  - 3. Identify construction activities likely to produce odor or dust.
  - 4. Identify areas of project potentially affected, especially occupied areas.
  - 5. Evaluate potential problems by severity and describe methods of control.
  - 6. Describe construction ventilation to be provided, including type and duration of ventilation, use of permanent HVAC systems, types of filters and schedule for replacement of filters.
  - 7. Describe cleaning and dust control procedures.
  - 8. Describe training of contractors and sub-contractors on IAQ procedures.
  - 9. Describe coordination with commissioning procedures.
- C. Interior Finishes Installation Schedule: Identify each interior finish that either generates odors, moisture, or vapors or is susceptible to adsorption of odors and vapors, and indicate air handling zone, sequence of application, and curing times.
- D. Duct and Terminal Unit Inspection Report.
- E. Air Contaminant Test Plan: Identify:
  - 1. Testing agency qualifications.
  - 2. Locations and scheduling of air sampling.
  - 3. Test procedures, in detail.
  - 4. Test instruments and apparatus.
  - 5. Sampling methods.
- F. Air Contaminant Test Reports: Show:
  - 1. Location where each sample was taken, and time.
  - 2. Test values for each air sample; average the values of each set of 3.
  - 3. HVAC operating conditions.
  - 4. Certification of test equipment calibration.
  - 5. Other conditions or discrepancies that might have influenced results.
- G. LEED Closeout Submittals:
  - 1. General: At completion of construction and prior to contract close-out, submit the following for information purposes in electronic format.
  - 2. Final Construction Indoor Air Quality Management, During Construction, Package for IEQ Credit 3.1: At completion of construction and prior to contract close-out, submit:
    - a. Approved Construction Indoor Air Quality Management Plan.
    - b. Construction Photographs: Six taken at 3 separate times for a total of eighteen (18) digital photographs of required construction indoor air quality management measures. Photos must be captioned with date, location in building, and identifying SMACNA measure:
      - 1) HVAC protection.
      - 2) Source Control.
      - 3) Pathway Interruption.
      - 4) Housekeeping.
      - 5) Scheduling.
      - 6) Protection of absorptive or dry sink materials, including but not limited to carpet, gypsum board, acoustical ceiling tiles, and insulation.
      - 7) Temporary filtration media, if HVAC is operated during construction.
    - c. Product data of filtration media used during construction and installed immediately prior to occupancy including MERV values, manufacturer's name and model number.
    - d. Meeting minutes, checklists, worksheets, notifications and deficiency or resolution logs related to the project IAQ issues.
    - e. Final LEED IEQ Credit 3.1 Online Template indicating compliance with credit requirements.

3. Final Construction Indoor Air Quality Management Plan, Prior to Occupancy, Package for IEQ Credit 3.2: At completion of construction and prior to contract close-out, submit:
  - a. Compliance Path Option 1: Approved Building Flush-out Schedule including a statement that space was not occupied until after delivery of minimum outside air requirements were met.
  - b. Compliance Path Option 2: Baseline Indoor Air Quality Testing reports showing results and location of each test indicating that the maximum chemical contaminate concentration requirements are not exceeded, a summary of HVAC operating conditions, a listing of discrepancies and recommendations for corrective actions, if needed.
    - 1) Include certification of test equipment calibration with each test report.
  - c. Final LEED IEQ Credit 3.2 Online Template indicating compliance with credit requirements.
4. Final Low Emitting Materials Package for IEQ Credits 4.1, 4.2, 4.3, and 4.4: Provide individual electronic folders for each credit containing:
  - a. Legible electronic copies of relevant material product data, with applicable criteria highlighted, for each product listed on the LEED Online Template.
  - b. Final LEED Online Template including all low-emitting materials used on Project.
5. LEED Online: Final LEED Online Template and associated required documentation uploaded to LEED Online for each of the following Credits:
  - a. IEQ Credit 3.1, Construction Indoor Air Quality Management, During Construction.
  - b. IEQ Credit 3.2, Construction Indoor Air Quality Management, Prior to Occupancy.
  - c. IEQ Credit 4.1, Low Emitting Materials, Adhesives and Sealants.
  - d. IEQ Credit 4.2, Low Emitting Materials, Paints and Coatings.
  - e. IEQ Credit 4.3, Low Emitting Materials, Carpet Systems.
  - f. IEQ Credit 4.4, Low Emitting Materials, Composite Wood and Agrifiber Products.
  - g. IEQ Credit 5, Indoor Chemical & Pollutant Source Control

## 1.6 SCHEDULING

- A. Coordinate construction activities to minimize or eliminate disruption of operations in occupied portions of building.
- B. Schedule for storage, installation, and protection of all components of air distribution systems.
- C. Schedule for storage, installation, and protect of absorptive materials (woven, fibrous or porous in nature, such as carpet, ceiling tiles, insulation, and fabrics) from exposure to emissions during and after installation from materials and finishes with potential for short-term release of off-gassing volatile organic compounds.
  1. Highlight critical methods used to protect absorptive materials from airborne pollutants such as: dust, debris, moisture, gaseous and microbial contamination.
  2. Sequence installation of absorptive materials after odor-emitting activities have occurred and have been mitigated by ventilation.
- D. Do not store absorptive materials on-site if protection measures as described above cannot be ensured.
- E. Avoid building occupancy while construction related pollutants are present.
- F. Ensure proper and complete curing of concrete before covering.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Low VOC Materials: See other sections for specific requirements for materials with low VOC content.
- B. Auxiliary Air Filters:

1. MERV of 8, minimum, when tested in accordance with ASHRAE 52.2, during construction. After completion of construction and immediately prior to occupancy, replace all filters with MERV 13 (or better) rated filtration media.

### **PART 3 - EXECUTION**

#### **3.1 CONSTRUCTION PROCEDURES**

- A. Prevent the absorption of moisture and humidity by adsorptive materials by:
  1. Sequencing the delivery of such materials so that they are not present in the building until wet work is completed and dry.
  2. Delivery and storage of such materials in fully sealed moisture-impermeable packaging.
  3. Provide sufficient ventilation for drying within reasonable time frame.
- B. Begin construction ventilation when building is substantially enclosed.
- C. HVAC system shall be kept clean, free of dust, debris, moisture, gaseous and microbial contamination during storage, handling, installation and punch-out. Inspect all air inlets, air outlets, grilles, diffusers, plenums, and ducts upon completion of Work.
  1. Cover and protect (taped plastic or similar method) all exposed air inlet and outlet openings, grilles, ducts, plenums, to prevent water, moisture, dust and other contaminate intrusion.
  2. Apply protection immediately after installation of equipment and ducting.
  3. Ducting runs that require more than a single day to install shall be protected at end of each day's Work.
  4. Leaks in return ducts and air handlers shall be checked and repaired.
  5. Inspect filtration monthly and replace as needed with new media throughout the HVAC system; filtration media shall be minimum MERV 8.
  6. After final phase of construction, install new filtration media throughout the HVAC system; filtration media shall be minimum MERV 13.
  7. Cleaning of ductwork is not part of this contract; however Contractor shall bear cost of cleaning required by Owner due to failure of Contractor to protect ducts and equipment from construction pollutants as specified.
- D. HVAC equipment and ductwork may NOT be used for ventilation during construction:
  1. Provide temporary ventilation equivalent to 1.5 air changes per hour, minimum.
  2. Exhaust directly to outside.
  3. Seal HVAC air inlets and outlets immediately after duct installation.
- E. Do not store construction materials or waste in mechanical or electrical rooms.
- F. Provide direct exhaust to the exterior during installation of strong emitting materials, including touch-up activities; keep exhaust away from intakes and occupied spaces.
- G. Provide adequate ventilation of packaged dry products prior to installations. Remove from package and place in a secure, dry, well-ventilated space, free from contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree maximum continuously during ventilations period. Do not ventilate within limits of Work unless otherwise approved by Architect.
- H. "Bake-out" or "super-heating" of spaces to accelerate the release of gaseous emissions is not permitted.
- I. Prohibit smoking and use of fossil-fueled temporary heating units inside the building and near building entrances, windows and intakes and within 25 feet of building entrances.
- J. Prior to use of return air ductwork without intake filters clean up and remove dust and debris generated by construction activities.
  1. Inspect duct intakes, return air grilles, and terminal units for dust.
  2. Clean plenum spaces, including top sides of lay-in ceilings, outsides of ducts, tops of pipes and conduit.

3. Clean tops of doors and frames.
  4. Clean mechanical and electrical rooms, including tops of pipes, ducts, and conduit, equipment, and supports.
  5. Clean return plenums of air handling units.
  6. Remove intake filters last, after cleaning is complete.
- K. Use low-toxic pest control chemicals such as boron, if needed, unless otherwise directed.
- L. Remove spills or excess application of solvent-containing products as soon as possible. Use low-emitting cleaning agents, giving preference to Green Seal products.
- M. Keep work areas as dry as possible; replace any absorptive (dry sink) material that is exposed to moisture.
- N. Use other relevant recommendations of SMACNA IAQ Guideline for Occupied Buildings Under Construction for avoiding unnecessary contamination due to construction procedures.

### 3.2 PATHWAY INTERRUPTION

- A. Provide negative pressurization of spaces under construction and/or demolition and positive pressurization of occupied or finished spaces while construction work proceeds in adjacent areas.
- B. Relocate pollutant sources when project equipment or staging areas coincide with critical air flow pathways and place plastic barriers to contain construction areas.
- C. Temporarily seal building, including air intakes and exhaust vents, and any other building openings, when dust-generating or strong-emitting construction products or procedures are used on the exterior of the building.
- D. Once spaces within building become occupied, work areas must remain under negative pressure. Exhaust air at a rate at least 10% greater than the rate of supply. Do not exhaust air where it can be drawn back into occupied spaces and place a continuous plastic barriers creating a seal between construction areas and occupied spaces.

### 3.3 INDOOR AIR QUALITY MANAGEMENT - PRIOR TO OCCUPANCY

- A. Contractor shall perform air contaminant testing, if testing fails, Contractor shall perform a full continuous flush-out.

### 3.4 AIR CONTAMINANT TESTING

- A. Perform air contaminant testing before occupancy, if testing fail, perform flush out as specified.
- B. Do not start air contaminant testing until:
1. All construction is complete, including interior finishes.
  2. HVAC systems have been tested, adjusted, and balanced for proper operation.
  3. Cleaning of inside of HVAC ductwork, specified elsewhere, has been completed.
  4. New HVAC filtration media have been installed.
- C. Indoor Air Samples: Collect from spaces representative of occupied areas:
1. Collect samples while operable windows and exterior doors are closed, HVAC system is running normally as if occupied, with design minimum outdoor air, but with the building unoccupied.
  2. Collect samples from spaces in each contiguous floor area in each air handler zone, but not less than one sample per 25,000 square feet; take samples from areas having the least ventilation and those having the greatest presumed source strength.
  3. Collect samples from height from 36 inches to 72 inches above floor.
  4. Collect samples from same locations on 3 consecutive days during normal business hours; average the results of each set of 3 samples.
  5. Exception: Areas with normal very high outside air ventilation rates, such as laboratories, do not need to be tested.

6. For each sampling point where maximum concentration limits are exceeded conduct flush-out with outside air and retest the specific parameter(s) that were exceeded to indicate the requirements are achieved; repeat procedure until all requirements have been met.
  7. When retesting the same building areas, take samples from at least the same locations as in first test.
- D. Outdoor Air Samples: Collect samples at outside air intake of each air handler at the same time as indoor samples are taken.
- E. Analyze air samples and submit report.
- F. Air Contaminant Concentration Determination and Limits:
1. Carbon Monoxide: Not more than 9 parts per million and not more than 2 parts per million higher than outdoor air.
  2. Formaldehyde: Not more than 27 parts per billion.
  3. Total Volatile Organic Compounds (TVOC): Not more than 500 micrograms per cubic meter.
  4. Particulates (PM10): Not more than 50 micrograms per cubic meter.
  5. 4-Phenylcyclohexene (4-PCH): Not more than 6.5 micrograms per cubic meter. This test is required only if carpets and fabrics with styrene butadiene rubber (SBR) latex backing are installed as part of the base building systems.

### 3.5 BUILDING FLUSH-OUT

- A. Perform building flush-out before occupancy, with all interior finishes installed and new filtration media in place.
- B. Do not start flush-out until:
1. All construction is complete.
  2. HVAC systems have been tested, adjusted, and balanced for proper operation.
  3. Inspection of inside of return air ducts and terminal units confirms that cleaning is not necessary.
  4. New HVAC filtration media have been installed.
- C. Building Flush-Out: Operate all ventilation systems at normal flow rates with 100 percent outside air until a total air volume of 14,000 cubic feet per square foot of floor area has been supplied.
1. Obtain Owner's concurrence that construction is complete enough before beginning flush-out.
  2. Maintain interior temperature of at least 60 degrees F and interior relative humidity no higher than 60 percent.
  3. If additional construction involving materials that produce particulates or any of the specified contaminants is conducted during flush-out, start flush-out over.
  4. Space may be occupied following delivery of a minimum of 3,500 cubic feet of outside air per square feet of floor area to space, until the total of 14,000 cubic feet per square foot of outside air has been delivered to the space, and:
    - a. Begin ventilation at least three hours prior to daily occupancy.
    - b. Continue ventilation during all occupied periods.
    - c. Provide minimum outside air volume of 0.30 cfm per square foot or design minimum outside air rate, whichever is greater.
- D. Install new HVAC filtration media after completion of flush-out and before occupancy or further testing.

### END OF SECTION



**SECTION 01 6000**  
**PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.1 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Supplemental Conditions and other Division 1 Specification Sections, apply to this Section.
- B. See specifically Articles 9 and 12 of the General Conditions of Contract.

**1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for Project products including product delivery, storage, protection, and handling; warranties; product options, comparable products and substitutions; and quality of workmanship. Refer to individual Specification Sections for products' technical requirements.
- B. The Contract is based on the products and standards specified in the Contract Documents without consideration of proposed substitutions or Comparable Products. Owner may reject proposed substitutions or Comparable Products at its discretion.
- C. Related Sections include the following:
  - 1. Division 1 Section "Alternates" for products selected under an alternate.
  - 2. Division 1 Section "References" for applicable industry standards for products specified.
  - 3. Division 1 LEED sections.
  - 4. Division 1 Section "Closeout Procedures" for submitting warranties for Contract closeout.
  - 5. Divisions 2 through 33 Sections for specific requirements for products including warranties on products and installations specified to be warranted.

**1.3 DEFINITIONS**

- A. Products: Items purchased 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, except that products consisting of recycled-content materials are allowed, unless explicitly stated otherwise. Products salvaged or recycled from other projects are not considered new products.
- B. Comparable (or Equal) Product: Contractor proposed 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. Comparable products are allowed when "or equal" is indicated in the individual product specification. The terms "Comparable Product" and "Or Equal Product" are considered interchangeable and of the same definition.
- C. Substitution: Contractor proposed change to a product required by the Contract Documents where the original product does not allow "or equal" products or the proposed changed product does not qualify as an "or equal" product.
- D. Basis-of-Design Product: A specific manufacturer's product named and accompanied by the words "basis-of-design," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical

properties, appearance, and other characteristics for purposes of evaluating comparable products of other named manufacturers.

#### 1.4 PRODUCT SUBSTITUTION REQUESTS

- A. General: Any proposed substitution must maintain the quality standards established by the Contract Documents for the specified product without any detrimental effect to the Owner. Refer to Section 12.6 of the General Conditions of Contract for additional requirements.
- B. Justification for Request: **Owner will not consider requests for substitution after Contract Award, except for extenuating circumstances as follows. Requests may be considered or rejected at discretion of Owner.**
  - 1. The product is no longer manufactured.
  - 2. The product is not available due to a strike, lockout or bankruptcy.
  - 3. The product is not available due to an Act of God.
  - 4. The specified product is identified as incompatible or inappropriate for the project.
  - 5. The specified item fails to comply with building code requirements.
  - 6. The manufacturer or fabricator declares a specified product to be unsuitable for the use intended and refuses to warrant its installation.
  - 7. The requested substitution will provide the Owner with a significant cost savings without affecting the desired effect of the specified product.
- C. Substitution Request Procedures: If the substitution request is justified per the preceding article, submit each substitution request per the following procedures:
  - 1. Limit each request to one proposed substitution.
  - 2. Substitution Request Form: Use CSI Form 13.1A or approved equal. Complete all lines. If a line is not applicable, indicate "N/A.". Identify the product to be replaced and the product to be substituted. Include Specification Section number, title and paragraph and Drawing numbers and titles.
  - 3. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified material or product cannot be provided.
    - b. Coordination information including a list of any changes or modifications needed to other parts of the Work and to construction performed by Owner and separate contractors that will be necessary to accommodate the proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitution with those of the product specified. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.
    - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
    - e. Samples, where applicable or requested.
    - f. List of similar installations for completed projects with project names and addresses and names and addresses of Architect/Engineers and Owners.
    - g. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
    - h. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
    - i. 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 lack of availability or delays in delivery.
    - j. Accurate cost information, including a proposal of change, if any, to the Contract Sum.
    - k. Contractor's certification that proposed substitution complies with requirements in the Contract Documents and is appropriate for applications indicated.

- I. 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.
      - m. Other information as necessary to assist evaluation.
- D. Architect/Engineer Review: Architect/Engineer will review Contractor's written request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect/Engineer will return request to Contractor, without recommendation to the Owner, to record noncompliance with these requirements:
  - 1. Written explanation stating one of the above reasons for justification of the substitution.
  - 2. Requested substitution does not require unacceptable revisions to the Contract Documents.
  - 3. Requested substitution is consistent with the Contract Documents and will produce desired results.
  - 4. Substitution request is fully documented and properly submitted.
  - 5. Requested substitution will not unnecessarily adversely affect Contractor's Construction Schedule.
  - 6. Requested substitution has received necessary approvals of authorities having jurisdiction.
  - 7. Requested substitution has been coordinated, and is compatible, with other portions of the Work.
  - 8. Requested substitution provides specified warranty.
  - 9. 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.
- E. Architect/Engineer's Action: If necessary, Architect/Engineer will request additional information or documentation for evaluation within one week of receipt of a substitution request. Within seven days of receipt of all required information or documentation, the Architect/Engineer will provide the Owner (with a copy to Contractor) with a recommendation to approve or reject the proposed substitution request.
- F. Owner Action: Within fourteen days of receipt of the Architect/Engineer's recommendation, the Owner will issue a written decision accepting or rejecting the proposed substitution. The rejection of any proposed substitution by the Owner will be final and without further recourse by the Contractor. In making such determinations, the Owner may, but will not be required to, rely upon the recommendations of the Architect/Engineer. If the event of Owner rejection, the specified product shall be provided. The time required for the Architect and Owner reviews of proposed substitution are not cause for delay to the contract time.
- G. Submission of a Shop Drawing, Sample or Product Data indicating a proposed variance from the Contract Documents is not a proper submission and does not constitute a Substitution Request. Approval of a Shop Drawing, Sample or Product Data indicating a proposed variance from the Contract Documents does not constitute approval of a Substitution.

#### 1.5 COMPARABLE ("OR EQUAL") PRODUCT REQUESTS:

- A. General: Any proposed Comparable Product Request must maintain the quality standards established by the Contract Documents for the specified product without any detrimental effect to the Owner. Refer to Section 12.6 of the General Conditions of Contract for additional requirements.
- B. Comparable Product Request Procedures:
  - 1. Limit each request to one proposed Comparable Product.
  - 2. Submit each comparable product request for consideration if specifically permitted by the individual Specification Section.
  - 3. Identify the product to be replaced and the product to be substituted. Include Specification Section number, title and paragraph and Drawing numbers and titles.

- C. Architect/Engineer Review: Owner will consider Contractor's request for Comparable Product when the following conditions are satisfied. If the following conditions are not satisfied, Architect/Engineer will return requests to Contractor, without recommendation to the Owner, to record noncompliance with these requirements:
  - 1. Evidence that the proposed product does not require extensive revisions to the Contract Documents; that it is consistent with the Contract Documents and will produce the desired results, and that it is compatible with other portions of the Work. Any costs associated with revisions to the Work and/or Contract Documents required by this substitution will be borne by the Contractor.
  - 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 Architect/Engineers and owners, if requested.
  - 5. Samples, if requested
- D. Architect/Engineer's Action: If necessary, Architect/Engineer will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Within seven days of receipt of all required information or documentation, the Architect/Engineer will provide the Owner (with a copy to Contractor) with a recommendation to approve or reject the proposed comparable product request.
- E. Owner Action: Within fourteen days of receipt of the Architect/Engineer's recommendation, the Owner will issue a written decision accepting or rejecting the proposed comparable product. The rejection of any proposed comparable product by the Owner will be final and without further recourse by the Contractor. In making such determinations, the Owner may, but will not be required to, rely upon the recommendations of the Architect/Engineer. If the event of Owner rejection, the specified product shall be provided. The time required for the Architect and Owner reviews of proposed substitution are not cause for delay to the contract time.
- F. Submission of a Shop Drawing, Sample or Product Data indicating a proposed comparable product is not a proper submission and does not constitute a Comparable Product Request. Approval of a Shop Drawing, Sample or Product Data indicating a proposed comparable product does not constitute approval of a Comparable Product.
- G. After approval of the substituted product, the Contractor will make a submittal in accordance with the requirements in Division 1 Section "Submittal Procedures".

#### 1.6 OTHER THAN "BASIS-OF-DESIGN" PRODUCT SPECIFICATION SUBMITTAL:

- A. If the Contractor submits a product other than the product specified as the basis of design, and the submitted alternate manufacturer is named in the relevant specification Section, that submittal shall be processed in accordance with requirements in Division 1 Section "Submittal Procedures." Contractor shall submit all required evidence to show alternate product's compliance with technical requirements and equivalency with the basis-of-design product. The Architect/Engineer may directly approve or disapprove this type of submittal; Owner review and action is not required. Any costs associated with revisions to the Work and/or Contract Documents required by the Contractor's request for other than the basis of design product will be borne by the Contractor.

#### 1.7 QUALITY ASSURANCE

- A. Source Limitations: To the fullest extent possible, provide products of the same kind from a single source. When specified products are available only from sources that do not, or cannot, produce a quantity adequate to complete project requirements in a timely manner, consult with the Architect/Engineer and Owner to determine the most important product qualities before proceeding. Qualities may include attributes, such as visual appearance, strength, durability, or

compatibility. After a determination has been made, provide products from sources producing products that possess these qualities, to the fullest extent possible.

- B. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, product selected shall be compatible with products previously selected, even if previously selected products were also options.
- C. Whenever the Contract Documents require that a product complies with Federal Specifications, ASTM Designations, ANSI Specifications or other association standard, the Contractor shall present an affidavit from the manufacturer certifying that the product complies therewith. Where requested or specified, submit supporting test data to substantiate compliance.
- D. Nameplates and labels: Except for required labels and operating data, do not attach or imprint manufacturer's or producer's nameplates or trademarks on exposed surfaces of products that will be exposed to view in occupied spaces or on the exterior.

#### 1.8 OWNER-FURNISHED PRODUCTS

- A. See Specification Section 01 10 00.

#### 1.9 PRODUCT DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft. Comply with manufacturer's written instructions and recommendations.
- 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 upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.
  - 5. Provide appropriate equipment and qualified personnel to move products on-site without damage.
  - 6. Each product shall be marked with unique identifiers including the project name, specifications reference and any other information needed to identify the product's specific use on the Project.
- C. Storage:
  - 1. Comply with product manufacturer's written instructions and recommendations for temperature, humidity, ventilation, and weather-protection requirements for storage.
  - 2. Store products to allow for inspection and measurement of quantity or counting of units.
  - 3. Prevent product contact with materials that may cause corrosion, discoloration or staining.
  - 4. Store materials in a manner that will not endanger Project or temporary structures.
  - 5. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.
  - 6. Provide off-site storage when site does not permit adequate on-site storage or protection.
  - 7. Store cementitious products and materials on elevated platforms.
  - 8. Store foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.
  - 9. Protect stored products from damage and liquids from freezing.

## 1.10 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: Preprinted written warranty published by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.
  - 2. 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.
- B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution. Submit a draft for approval before final 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 appropriate form properly executed.
  - 3. Refer to Divisions 2 through 33 Sections for specific content requirements and particular requirements for submitting special warranties.
- C. Submittal Time: Comply with requirements in Division 1 Section "Closeout Procedures."

## PART 2 PRODUCTS

### 2.1 PRODUCT SELECTION AND PROVISION PROCEDURES

- A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, that are new at time of installation.
  - 1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
  - 2. Products required to be supplied in quantity within a Specification Section shall be of the same manufacture, shall be interchangeable, and shall be the same with regard to function, texture, pattern and color. To the greatest extent possible, provide products from a single source.
  - 3. 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.
  - 4. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
  - 5. Materials specified on the Contract Documents by reference to title, symbol, or number of a Commercial or Industry Standard, Federal Specification, ASTM designation, ANSI designation, Manufacturer's data, or other similar reference standard are identified hereby as the minimum requirement for the quality of materials required hereunder. References are to the latest editions of same, except as indicated otherwise. If not in contradiction to the building code or regulations of other governmental agencies as may have jurisdiction, such reference documents shall be considered as an integral part of these specifications as if repeated word for word herein.
  - 6. In case of conflict between differing specifications for a product, the most stringent specification (or the most stringent combination of specifications) shall apply. Contact the Architect/Engineer regarding interpretation of specifications as required.
  - 7. Do not use products salvaged from existing premises, except as specifically specified on the Contract Documents.
  - 8. Where products are accompanied by the term "as selected," Architect/Engineer will make selection.
  - 9. Where products are accompanied by the term "match sample," sample to be matched is Architect/Engineer's.

10. 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 product and manufacturer, provide the named product that complies with requirements.
  2. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements.
  3. Products: Where Specifications include a list of names of both products and manufacturers, provide one of the products listed that complies with requirements.
  4. Manufacturers: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements.
  5. Where Specifications specify products or manufacturers by name, accompanied by the term "or equal" or "or approved equal," comply with the Contract Document provisions concerning "comparable products" to obtain approval for use of an unnamed product
  6. Product Options: Where Specifications indicate that sizes, profiles, and dimensional requirements on Drawings are based on a specific product or system, provide the specified product or system. Comply with provisions in Part 1 "Product Substitutions" Article for consideration of an unnamed product or system.
  7. Basis-of-Design Product: Where Specifications name a product and include a list of manufacturers, provide the specified 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 provisions in Part 1 "Other than Basis-of-Design Products" Article for consideration of an unnamed product by the other named manufacturers.
  8. Compliance with Standards, Codes, and Regulations: Where Specifications only require compliance with an imposed code, standard, or regulation, select a product that complies with the standards, codes, or regulations specified. Provide an affidavit from the manufacturer certifying that the product complies with standards, codes, or regulations and submit supporting test data to substantiate compliance, if requested by Owner.
  9. Visual Matching Specification: Where Specifications require matching an established Sample, select a product that complies with requirements and matches Architect/Engineer's sample. Architect/Engineer's decision will be final on whether a proposed product matches.
    - a. If no product available within specified category matches and complies with other specified requirements, comply with provisions in Part 1 "Product Substitutions" Article for proposal of product.
  10. Visual Selection Specification: Where Specifications include the phrase "as selected from manufacturer's colors, patterns, and textures" or a similar phrase, select a product that complies with other specified requirements.
    - a. Standard Range: Where Specifications include the phrase "standard range of colors, patterns, textures" or similar phrase, Architect/Engineer will select color, pattern, density, or texture from manufacturer's product line that does not include premium items.
    - b. Full Range: Where Specifications include the phrase "full range of colors, patterns, textures" or similar phrase, Architect/Engineer will select color, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

### **PART 3 EXECUTION**

#### **3.1 INSTALLATION OF PRODUCTS**

- A. Products shall be applied, installed, connected, erected, used, adjusted, cleaned and conditioned in accordance with the respective manufacturer's instructions and recommendations unless more stringent requirements are specified.

- B. Verify and coordinate clearances, dimensions and installation of adjoining construction, equipment, piping, ducts, conduits, or other mechanical or electrical items or apparatus.
- C. Prior to fabrication, field measure actual existing conditions as applicable to ensure proper fit.
- D. Inspect each item of material or equipment immediately prior to installation. Reject damaged and defective items.
- E. Recheck measurements and dimensions of Work, as an integral step of starting each installation. Whenever stock manufactured products are specified, verify actual space requirements for setting or placing into allotted space.
- F. Anchor each product securely in place with positive anchorage devices designed and sized to withstand expected loads. Anchors shall be accurately located and aligned with other Work.
- G. Allow for expansion of materials and building movement.

### 3.2 PROTECTION OF INSTALLED WORK

- A. Clean, protect, adjust and perform maintenance on installed Work as necessary to ensure freedom from damage and deterioration at time of Substantial Completion. Remove protective devices when no longer needed.
- B. Provide special protection where specified in individual Specification Sections.
- C. Provide temporary and removable materials for protection of installed products. Control activity in immediate work area to minimize damage.
- D. Protect finished Work from damage, defacements, stains, scratches, and wear.
- E. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- F. Protect finished floors, stairs, and other surfaces from traffic dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- G. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- H. Prohibit traffic from lawn and landscaped areas

### 3.3 QUALITY STANDARDS

- A. Workmanship specified or indicated on the Drawings by reference to title, symbol, or number of a Commercial or Industry Standard, ASTM designation, ANSI designation, Manufacturer's data, or other similar reference standard is identified hereby as the minimum requirement for the quality of workmanship required hereunder. References are to the current issues of same, except as indicated otherwise. If not in contradiction to the building code or regulations of other governmental agencies as may have jurisdiction, such referenced documents shall be considered as an integral part of these specifications as if repeated word for word herein.
- B. Architect/Engineer may require that copies of certain reference specifications be kept at the job site.
- C. Damaged products shall be not installed as part of the Work. At the Owner's sole discretion, the Owner may approve the use of repaired items in the Work. The Contractor shall bear all costs related to replacing or repairing and refurbishing damaged products.

### 3.4 WORKMANSHIP

- A. Note that the quality required for certain workmanship specified in respective Specification sections may be better than that established by the identified reference standards.
- B. Comply with industry standards except when more restrictive tolerances or specified requirements indicate more rigid standards or more precise workmanship.
- C. Perform work by persons qualified to produce workmanship of specified quality.



3.5 MANUFACTURERS' INSTRUCTIONS

- A. When work is specified to comply with manufacturers' instructions, submit copies as specified in 01 33 00, distribute copies to persons involved, and maintain one set in field office.

**END OF SECTION**



**SECTION 01 6116.00**  
**VOLATILE ORGANIC COMPOUND (VOC) CONTENT RESTRICTIONS**

**PART 1 - GENERAL**

**1.1 SECTION INCLUDES**

- A. Low-emitting restrictions for product categories listed below under "DEFINITIONS."
- B. VOC-restricted products.
- C. All products of each category that are installed in the project must comply; Owner's project goals do not allow for partial compliance.

**1.2 DEFINITIONS**

- A. Low-Emitting Products: All products of each of the following categories when installed or applied on-site in the building interior:
  - 1. Adhesives, sealants, and sealer coatings.
  - 2. Carpet tile.
  - 3. Resilient floor coverings, base, and accessories.
  - 4. Paints and coatings.
  - 5. Cabinet work.
  - 6. Composite wood and agrifiber products used either alone or as part of another product.
  - 7. Laminating adhesives used in composite wood and agrifiber product assemblies, shop-applied and applied on-site: No added urea-formaldehyde resins.
- B. Interior of Building: Within the building waterproofing envelope.
- C. Adhesives: All gunnable, trowelable, liquid-applied, and aerosol adhesives, whether specified or not; including flooring adhesives, resilient base adhesives, and pipe jointing adhesives.
- D. Sealants: All gunnable, trowelable, and liquid-applied joint sealants and sealant primers, whether specified or not; including firestopping sealants and duct joint sealers.

**1.3 REFERENCE STANDARDS**

- A. CRI (GLP) - Green Label Plus Carpet Testing Program - Approved Products; Carpet and Rug Institute.
- B. CRI(GL) - Green Label Carpet Cushion Testing Program - Approved Products; Carpet and Rug Institute.
- C. South Coast Air Quality Management District (SCAQMD) Rule #1168 - Volatile organic compound (VOC) limits for adhesives, sealants, and sealant primers.
- D. Green Seal Standard GS11, Paints, 1st Edition, May 20, 1993.
- E. Green Seal Standard GC-03, Anti-Corrosive Paints, 2nd Edition, January 7, 1997.
- F. South Coast Air Quality Management District (SCAQMD) Rule #1113 - Volatile organic compound (VOC) limits for clear wood finishes, floor coatings, stains, primers, and shellacs.
- G. FloorScore Program - Resilient Floor Covering Institute
- H. GREENGUARD GOLD.
- I. CA01350.
- J. Collaborative for High Performance Schools (CHPS)

**1.4 SUBMITTALS**

- A. See Section 01 33 00 - Submittal procedures, for submittal procedures.
- B. Evidence of Compliance: Submit for each different product in each applicable category.

1. Identify evidence submittals with the words "LEED Report".
- C. Product Data: For each VOC-restricted product used in the project, submit product data showing compliance, except when another type of evidence of compliance is required.
  1. Adhesives, sealants, paints and coatings: VOC content as measured in grams per Liter (g/L).
- D. Product Data: For each flooring installed in the project, submit product data showing compliance.
  1. Carpet: Carpet and Rug Institute Green Label Plus
  2. Carpet Pad: Carpet and Rug Institute Green Label
  3. Resilient Flooring, Base, and Accessories: FloorScore certification
  4. Alternative compliance: CA 01350, GREENGUARD Gold, Collaborative for High Performance Schools (CHPS)
- E. Product Data: For each composite wood, agrifiber product and laminating adhesive installed in the project, submit product data showing no added urea formaldehyde resins.
- F. Installer Certifications for Accessory Materials: Require each installer of any type of product (not just the products for which VOC restrictions are specified) to certify that either 1) no adhesives, joint sealants, paints, coatings, or composite wood or agrifiber products have been used in the installation of his products, or 2) that such products used comply with these requirements.
  1. Use the form following this section for installer certifications.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Adhesives applied within the building waterproofing envelope shall comply with the current VOC Content limits, as expressed in grams per liter, of South Coast Air Quality Management District (SCAQMD) Rule 1168 "Adhesive and Sealant Applications," amended January 7, 2005, or more stringent levels, as follows (Adhesives and sealants integral to the waterproofing membrane are exempt.):
  1. Indoor Carpet & Pad Adhesives: 50.
  2. Wood Flooring Adhesive: 100.
  3. Rubber Floor Adhesives: 60.
  4. Subfloor Adhesives: 50.
  5. Ceramic Tile Adhesives: 65.
  6. VCT and Asphalt Tile (& Linoleum) Adhesives: 50.
  7. Dry Wall and Panel Adhesives: 50.
  8. Cove Base Adhesives: 50.
  9. Multipurpose Construction Adhesives: 70.
  10. Structural Glazing Adhesives: 100.
  11. PVC Welding: 510.
  12. CPVC Welding: 490.
  13. ABS Welding: 325.
  14. Plastic Cement Welding: 250.
  15. Adhesive Primer for Plastic: 550.
  16. Contact Adhesive: 80.
  17. Special Purpose Contact Adhesive: 250.
  18. Structural Wood Member Adhesive: 140.
  19. Metal to metal substrates: 30.
  20. Plastic foam substrate: 50.
  21. Porous substrate except wood: 50.
  22. Wood substrate: 30.
  23. Fiberglass substrate: 80.

- 24. All Other Welding & Installation Adhesives: 250.
- 25. Adhesives and sealants integral to the waterproofing membrane are exempt.
- B. Aerosol Adhesives applied within building waterproofing envelope shall comply with the VOC Content limits, as expressed in percentage of VOCs by weight, of Green Seal (GS) Standard GS-36 "Commercial Adhesives," October 19, 2000 as follows:
  - 1. General Purpose Mist Spray: 65% VOCs by weight.
  - 2. General Purpose Web Spray: 55% VOCs by weight.
  - 3. Special Purpose Aerosol Adhesives (all types): 70% VOCs by weight.
- C. Sealants applied within building waterproofing envelope shall comply with VOC Content limits, as expressed in grams per liter, less water and exempt compounds, of SCAQMD Rule 1168 "Adhesive and Sealant Applications," amended January 7, 2005, as follows:
  - 1. Architectural Sealants: 250.
  - 2. Non-membrane Roof: 300.
  - 3. Single-Ply Roof Membrane: 450.
  - 4. Other: 420.
- D. Sealant primers applied within building waterproofing envelope shall comply with VOC Content limits, as expressed in grams per liter, less water and exempt compounds, of SCAQMD Rule 1168 "Adhesive and Sealant Applications," amended January 7, 2005, as follows:
  - 1. Architectural, Nonporous: 250.
  - 2. Architectural, Porous: 775.
  - 3. Other: 750.
- E. Paints and Coatings:
  - 1. Provide coatings that comply with the most stringent requirements specified in the following:
    - a. 40 CFR 59, Subpart D--National Volatile Organic Compound Emission Standards for Architectural Coatings.
  - 2. Credit EQ 4.2: VOC limits for interior-applied paints and coatings.
    - a. Flat Paints, Coatings, and Primers: VOC not more than 50 g/L.
    - b. Non-Flat Paints, Coatings, and Primers: VOC not more than 150 g/L.
    - c. Anticorrosive and Antirust Paints Applied to Ferrous Metals: VOC not more than 250 g/L.
    - d. Clear Wood Finishes, Varnishes: VOC not more than 350 g/L.
    - e. Clear Wood Finishes, Lacquers: VOC not more than 550 g/L.
    - f. Floor Coatings: VOC not more than 100 g/L.
    - g. Shellacs, Clear: VOC not more than 730 g/L.
    - h. Shellacs, Pigmented: VOC not more than 550 g/L.
    - i. Stains: VOC not more than 250 g/L.
    - j. Waterproofing Sealers: VOC not more than 250 g/L.
    - k. Sanding Sealers: VOC content not more than 350 g/L.
    - l. Sealers, All Other: VOC content not more than 200 g/L.
  - 3. Determination of VOC Content: Testing and calculation in accordance with 40 CFR 59, Subpart D (EPA Method 24), exclusive of colorants added to a tint base and water added at project site; or other method acceptable to authorities having jurisdiction.
  - 4. Evidence of Compliance: Acceptable types of evidence are:
    - a. Report of laboratory testing performed in accordance with requirements.
- F. Carpet and Carpet Tile: Provide products having contaminant emissions not greater than that required for CRI Green Label Plus certification.
  - 1. Evidence of Compliance: Acceptable types of evidence are:
    - a. Current Green Label Plus Certification.
    - b. Report of laboratory testing performed in accordance with requirements.
- G. Carpet Cushion: Provide products having contaminant emissions not greater than that required for CRI Green Label certification.

1. Current Green Label Certification.
  2. Report of laboratory testing performed in accordance with requirements.
- H. Hard Surface Flooring: Provide products certified as compliant with the FloorScore standard. Flooring products covered by this standard include vinyl, linoleum, laminate flooring, wood flooring, ceramic flooring, rubber flooring, and wall base except solid unfinished wood and mineral-based integrally finished flooring.
1. Current FloorScore Certification.
  2. Report of laboratory testing performed in accordance with requirements.
- I. Carpet Adhesive: Provide products having VOC content as specified in Section 09 6813 & 09 6800.
- J. Tile setting adhesives and grouts: Provide products having VOC content as specified in Section 09 3000.
- K. Composite Wood and Agrifiber Products and Adhesives Used for Laminating Them: Provide products having no added urea-formaldehyde resins.
1. Evidence of Compliance: Acceptable types of evidence are:
    - a. Published product data showing compliance with requirements.
- L. Other Product Categories: Comply with limitations specified elsewhere.

### **PART 3 - EXECUTION**

#### **3.1 FIELD QUALITY CONTROL**

- A. Owner reserves the right to reject non-compliant products, whether installed or not, and require their removal and replacement with compliant products at no extra cost to Owner.
- B. All additional costs to restore indoor air quality due to installation of non-compliant products will be borne by Contractor.

**END OF SECTION**

**SECTION 01 6116.01**  
**ACCESSORY MATERIAL VOC CONTENT CERTIFICATION FORM**

**.1 FORM**

- A. Identification:
1. Project Name: \_\_\_\_\_
  2. Project No.: \_\_\_\_\_
  3. Architect: \_\_\_\_\_
- B. Use of This Form:
1. Because installers are allowed and directed to choose accessory materials suitable for the applicable installation, there is a possibility that such accessory materials might contain VOC content in excess of that permitted, especially where such materials have not been explicitly specified.
  2. Contractor is required to obtain and submit this form from each installer of work on this project.
  3. For each product category listed, circle the correct words in brackets: either [HAS] or [HAS NOT].
  4. If any of these accessory materials has been used, attach to this form product data and MSDS sheet for each such product.
  5. [HAS] [HAS NOT] required the use of any LAMINATING ADHESIVES.
- C. VOC content restrictions are specified in Section 01 6116.

**1.1 PRODUCT CERTIFICATION**

- A. I certify that the installation work of my firm on this project:
1. [HAS] [HAS NOT] required the use of any ADHESIVES.
  2. [HAS] [HAS NOT] required the use of any JOINT SEALANTS.
  3. [HAS] [HAS NOT] required the use of any PAINTS OR COATINGS.
  4. [HAS] [HAS NOT] required the use of any COMPOSITE WOOD or AGRIFIBER PRODUCTS.
- B. Product data and MSDS sheets are attached.

**2.1 CERTIFIED BY: (Installer/Manufacturer/Supplier Firm)**

- A. Firm Name: \_\_\_\_\_
- B. Print Name: \_\_\_\_\_
- C. Signature: \_\_\_\_\_
- D. Title: \_\_\_\_\_ (officer of company)
- E. Date: \_\_\_\_\_

**END OF SECTION**





**SECTION 01 7300  
EXECUTION REQUIREMENTS**

**PART 1 GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes general procedural requirements governing execution of the Work including, but not limited to, the following:
  - 1. General installation of products.
  - 2. Progress cleaning.
  - 3. Starting and adjusting.
  - 4. Protection of installed construction.
  - 5. Correction of the Work.
- B. Related Sections include the following:
  - 1. Division 1 Section "Project Management and Coordination" for field survey and layout requirements.
  - 2. Division 1 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
  - 3. Division 1 Section "Closeout Procedures" for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
  - 4. Division 1 Sections "Construction Waste Management" and "Indoor Air Quality (IAQ) Management" for Sustainable Design and/or LEED-related requirements.

**1.3 SUBMITTALS**

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

**PART 2 PRODUCTS (NOT USED)**

**PART 3 EXECUTION**

**3.1 EXAMINATION**

- A. Existing Utilities: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities and other construction affecting the Work.
  - 1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; and underground electrical services.
  - 2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.
- B. Acceptance of Conditions: 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. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

2. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.
3. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
4. Do not proceed with Work until unsatisfactory conditions have been corrected. Proceeding with Work indicates acceptance of surfaces and conditions; the cost of any corrective measures is the responsibility of the Contractor.

### 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. Require compliance with manufacturer's printed installation instructions, including each step in sequence. Do not omit preparatory steps or installation procedures unless specifically modified or exempted by Contract Documents. See Specification 01 60 00 for specific requirements.
- E. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents, submit a request for information to Architect/Engineer accordance with the requirements specified in Specification Section 01 31 00.

### 3.3 INSTALLATION

- A. General: See Specification Section 01 60 00 for Product Installation requirements.
- B. 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 8 feet in spaces without a suspended ceiling.
- 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. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
- H. Anchors and Fasteners: Provide anchors and fasteners as required to anchor each component securely in place, accurately located and aligned with other portions of the Work.
  1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect/Engineer.

2. Allow for building movement, including thermal expansion and contraction.
  3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.
  - J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.4 PROGRESS CLEANING

- A. General: Clean Project site and work areas daily, including common areas. Coordinate progress cleaning for joint-use areas where more than one installer has worked. 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 materials more than 7 days during normal weather or 3 days if the temperature is expected to rise above 80 deg F.
  3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
- 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: Burying or burning waste materials on-site will not be permitted. Washing waste materials down sewers or into waterways will not be permitted.
- 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.

### 3.5 STARTING AND ADJUSTING

- A. See other Specification Sections for additional information on start-up and testing of building components.

- B. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.
- C. Adjust operating components for proper operation without binding. Adjust equipment for proper operation.
- D. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
- E. Manufacturer's Field Service: If a factory-authorized service representative is required to inspect field-assembled components and equipment installation, comply with qualification requirements in Division 1 Section "Quality Requirements."

### 3.6 PROTECTION OF INSTALLED CONSTRUCTION

- A. See Specification Section 01 60 00 for product protection requirements.
- B. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- C. Comply with manufacturer's written instructions for temperature and relative humidity.

### 3.7 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 1 Section "Cutting and Patching."
  - 1. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment.
- B. Restore permanent facilities used during construction to their specified condition.
- C. Remove and replace damaged surfaces that are exposed to view if surfaces cannot be repaired without visible evidence of repair.
- D. Repair components that do not operate properly. Remove and replace operating components that cannot be repaired.
- E. Remove and replace chipped, scratched, and broken glass or reflective surfaces.

**END OF SECTION**

**SECTION 01 7329  
CUTTING AND PATCHING**

**PART 1 GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes procedural requirements for cutting and patching.
- B. Related Sections include the following:
  - 1. Divisions 2 through 33 Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.
  - 2. Division 7 Section for Firestopping

**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 surfaces to original conditions after installation of other Work.

**1.4 SUBMITTALS**

- A. Cutting and Patching Proposal: For each specific type of requested cutting and patching, submit a written proposal to Architect/Engineer for approval at least 10 days before any cutting and patching will be performed. Proposal shall include the following information:
  - 1. Extent: Describe amount, location, and size of proposed cutting and patching, and indicate why this cutting cannot be avoided
  - 2. Procedures: Specifically describe how cutting and patching will be performed,
  - 3. Changes to In-Place Construction: Describe anticipated results. Include changes to structural elements and operating components as well as changes in building's appearance and other significant visual elements.
  - 4. Products: List products to be used. Provide specific information on products as requested by Architect/Engineer.
  - 5. Trades: Indicate the firms or entities that will perform the cutting and patching.
  - 6. Dates: Indicate when cutting and patching will be performed.
  - 7. Structural Elements: Where cutting and patching involve modifying structural elements, submit details and engineering calculations, generated by an engineer registered in the State of Maryland, indicating structural integrity of proposed modification.
  - 8. Effect on weatherproof integrity of the Work.
  - 9. Utilities: List utilities that cutting and patching activities will affect. Indicate utilities that will need to be temporarily out of service and the planned length and time of the outage. Indicate utilities that will need to be relocated.
  - 10. Cost proposal when applicable.
  - 11. Architect/Engineer's Approval: Obtain Architect/Engineer's approval of cutting and patching proposal before cutting and patching. Approval does not waive right to later require removal and replacement of unsatisfactory work.

### 1.5 QUALITY ASSURANCE

- A. Structural Elements: Do not cut and patch structural elements in a manner that could reduce their load-carrying capacity or load-deflection ratio.
- B. 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 results in increased maintenance or decreased operational life or safety.
- C. Miscellaneous Elements: Do not cut and patch miscellaneous elements or related components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or results in increased maintenance or decreased operational life or safety.
- D. Visual Requirements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch construction exposed on the exterior or in occupied spaces in a manner that would, in Architect/Engineer's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.
- E. Fire-Rated Assemblies: At penetrations of fire-rated assemblies, completely seal penetration with firestop in accordance with Division 7 Section.
- F. Cutting and Patching Conference: Before proceeding, meet at Project site with parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

### 1.6 WARRANTY

- A. 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 or diminish required or existing warranties.

## PART 2 PRODUCTS

### 2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
- B. In-Place Materials: Use materials 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 match the visual and functional performance of in-place materials.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Examine surfaces to be cut and patched and conditions under which cutting and patching are to be performed. Comply with provisions of Section 01700.
  - 1. Compatibility: Before patching, verify compatibility with and suitability of substrates, including compatibility with in-place finishes or primers.
  - 2. Proceed with installation only after unsafe or unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

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

- B. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations. Protect surroundings areas from any dust or other residue resulting from cutting and patching operations.
- C. Adjoining Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

### 3.3 PERFORMANCE

- A. General: Cut in-place construction to provide for installation or removal of components of the Work, and subsequently patch as required to restore surfaces to their original condition. Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time after approval, and complete without delay.
- B. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage retained elements or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
  - 1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots as small as possible, neatly to size required, and with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.
  - 2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.
  - 3. Concrete and masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill. Do not damage or cut any steel reinforcing unless specifically allowed by the approved cutting and patching proposal.
  - 4. Structure: Do not damage or cut any structural framing unless specifically allowed by the approved cutting and patching proposal.
  - 5. Excavating and Backfilling: Comply with requirements in applicable Division 2 Sections where required by cutting and patching operations.
  - 6. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.
  - 7. Proceed with patching after construction operations requiring cutting are complete.
- C. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other Work. Patch with durable seams that are as invisible as possible. Provide materials and comply with installation requirements specified in other Sections.
  - 1. Inspection: Test and inspect patched areas after completion to demonstrate integrity of installation.
  - 2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.
    - a. Clean piping, conduit, and similar features before applying paint or other finishing materials.
    - b. Restore damaged pipe covering to its original condition.
  - 3. Floors and Walls: 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, apply primer and intermediate paint coats over the patch and apply final paint coat over entire unbroken surface containing the patch. Provide additional coats until patch blends with adjacent surfaces.
  - 4. Ceilings: Patch, repair, or rehang 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.
  6. Utilities: Where utilities are to be removed, relocated, or abandoned, by-pass before cutting. Cut-off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal the remaining portion of pipe, duct, or conduit to prevent entrance of moisture or matter after by-passing and cutting.
- D. Cleaning: Clean areas and spaces where cutting and patching are performed. Completely remove debris, paint, mortar, oils, putty, and similar materials.
- E. Painting: Where patching occurs in previously painted surface, provide appropriate prime coat followed by first finish coat of paint. Provide final finish coat over entire area containing patch; for continuous surface extend to nearest vertical break or intersection, for an assembly refinish entire unit. Except where indicated otherwise, finish in sheen and color to match existing.

**END OF SECTION**



**SECTION 01 7419**  
**CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

**PART 1 GENERAL**

**1.1 WASTE MANAGEMENT REQUIREMENTS**

- A. Owner requires that this project generate the least amount of trash and waste possible.
- B. Employ processes that ensure the generation of as little waste as possible due to error, poor planning, breakage, mishandling, contamination, lack of protection from weather, or other factors.
- C. Minimize trash/waste disposal in landfills; reuse, salvage, or recycle as much waste as economically feasible.
- D. Required Recycling, Salvage, and Reuse: The following may not be disposed of in landfills or by incineration:
  - 1. Aluminum and plastic beverage containers.
  - 2. Corrugated cardboard.
  - 3. Wood pallets.
  - 4. Clean dimensional wood: May be used as blocking or furring.
  - 5. Land clearing debris, including brush, branches, logs, and stumps.
  - 6. Metals, including packaging banding, metal studs, sheet metal, structural steel, piping, reinforcing bars, door frames, and other items made of steel, iron, galvanized steel, stainless steel, aluminum, copper, zinc, lead, brass, and bronze.
- E. LEED Certification for this project is dependent on diversion of 75 percent, by weight, of potential landfill trash/waste by recycling and/or salvage.
- F. Contractor shall submit periodic Waste Disposal Reports; all landfill disposal, recycling, salvage, and reuse must be reported regardless of to whom the cost or savings accrues; use the same units of measure on all reports.
- G. Contractor shall develop and follow a Waste Management Plan designed to implement these requirements.
- H. The following sources may be useful in developing the Waste Management Plan:
  - 1. "Maryland Recycles" website: <http://www.mdrecycles.org/> for local resources related to construction materials recycling and salvage.
  - 2. Maryland Commercial Recycling Specialists (410) 333-3066.
  - 3. "Builders' Guide to Reuse & Recycling: A Directory for Construction and Demolition Materials in the Metropolitan Washington Region": [www.mwcog.org/buidersrecyclingguide/](http://www.mwcog.org/buidersrecyclingguide/)
  - 4. "MACREDO: Mid-Atlantic Consortium of Recycling and Economic Development Officials" provides a recycling markets and sources directory for the Mid-Atlantic States; website: <http://macredo.libertynet.org/index.html>
  - 5. Habitat Restore of Northern Virginia, for construction materials reuse, 7770 Richmond Highway, Alexandria, VA 22306, (703) 360-6700, <http://www.restorenova.org>.
  - 6. "Used Building Materials Association (UBMA)" [www.ubma.org](http://www.ubma.org).
  - 7. The Loading Dock, Inc., Baltimore, MD.
  - 8. Second Chance Inc., Baltimore, MD.
- I. Methods of trash/waste disposal that are not acceptable are:
  - 1. Burning on and off the project site.
    - a. Waste-to-energy cannot be utilized as a landfill diversion strategy. Only wood derived fuel can contribute to MRc2.
  - 2. Burying on the project site.
  - 3. Dumping or burying on other property, public or private.

- 4. Other illegal dumping or burying.
- J. Regulatory Requirements: Contractor is responsible for knowing and complying with regulatory requirements, including but not limited to Federal, state and local requirements, pertaining to legal disposal of all construction and demolition waste materials.

## 1.2 RELATED REQUIREMENTS

- A. Section 01 33 00 - Submittal Procedures: Additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. Section 01 60 00 - Product Requirements: Waste prevention requirements related to delivery, storage, and handling.
- C. Section 01 73 00 - Execution Requirements: Trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.
- D. Section 02 41 00 - Demolition: Demolition of existing library building.
- E. Section 31 10 00 - Site Clearing: Handling and disposal of land clearing debris.

## 1.3 DEFINITIONS

- A. Clean: Untreated and unpainted; not contaminated with oils, solvents, caulk, or the like.
- B. Construction and Demolition Waste: Solid wastes typically including building materials, packaging, trash, debris, and rubble resulting from construction, remodeling, repair and demolition operations.
- C. Hazardous: Exhibiting the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity or reactivity.
- D. Nonhazardous: Exhibiting none of the characteristics of hazardous substances, i.e., ignitibility, corrosivity, toxicity, or reactivity.
- E. Nontoxic: Neither immediately poisonous to humans nor poisonous after a long period of exposure.
- F. Recyclable: The ability of a product or material to be recovered at the end of its life cycle and remanufactured into a new product for reuse by others.
- G. Recycle: To remove a waste material from the project site to another site for remanufacture into a new product for reuse by others.
- H. Recycling: The process of sorting, cleansing, treating and reconstituting solid waste and other discarded materials for the purpose of using the altered form. Recycling does not include burning, incinerating, or thermally destroying waste.
- I. Return: To give back reusable items or unused products to vendors for credit.
- J. Reuse: To reuse a construction waste material in some manner on the project site.
- K. Salvage: To remove a waste material from the project site to another site for resale or reuse by others.
- L. Sediment: Soil and other debris that has been eroded and transported by storm or well production run-off water.
- M. Source Separation: The act of keeping different types of waste materials separate beginning from the first time they become waste.
- N. Toxic: Poisonous to humans either immediately or after a long period of exposure.
- O. Trash: Any product or material unable to be reused, returned, recycled, or salvaged.
- P. Waste: Extra material or material that has reached the end of its useful life in its intended use. Waste includes salvageable, returnable, recyclable, and reusable material.

#### 1.4 SUBMITTALS

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. LEED Submittals: Submit Landfill Alternatives Proposal, Waste Management Plan, and Waste Disposal Reports in accordance with procedures specified in Section 01 35 15.
- C. Waste Management Plan: Include the following information:
  - 1. Analysis of the trash and waste projected to be generated during the entire project construction cycle, including types and quantities.
  - 2. Landfill Options: The name, address, and telephone number of the landfill(s) where trash/waste will be disposed of, the applicable landfill tipping fee(s), and the projected cost of disposing of all project trash/waste in the landfill(s).
  - 3. Landfill Alternatives: List all waste materials that will be diverted from landfills by reuse, salvage, or recycling.
  - 4. Meetings: Describe regular meetings to be held to address waste prevention, reduction, recycling, salvage, reuse, and disposal.
  - 5. Materials Handling Procedures: Describe the means by which materials to be diverted from landfills will be protected from contamination and prepared for acceptance by designated facilities; include separation procedures for recyclables, storage, and packaging.
  - 6. Transportation: Identify the destination and means of transportation of materials to be recycled; i.e. whether materials will be site-separated and self-hauled to designated centers, or whether mixed materials will be collected by a waste hauler.
  - 7. Training: Describe procedures for training contractors and sub-contractors on procedures and responsibilities for complying with Waste Management Plan.
- D. Waste Disposal Reports: Submit at monthly, with details of quantities of trash and waste, means of disposal or reuse, and costs; show both totals to date and since last report.
  - 1. Submit updated Report with each Application for Progress Payment; failure to submit Report will delay payment.
  - 2. LEED Online: Complete LEED Form including the amount of recycled and salvaged construction and demolition waste to date.
  - 3. Landfill Disposal: Include the following information:
    - a. Identification of material.
    - b. Amount, in tons or cubic yards, of trash/waste material from the project disposed of in landfills.
    - c. State the identity of landfills, total amount of tipping fees paid to landfill, and total disposal cost.
    - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
  - 4. Recycled and Salvaged Materials: Include the following information for each:
    - a. Identification of material, including those retrieved by installer for use on other projects.
    - b. Amount, in tons or cubic yards, date removed from the project site, and receiving party.
    - c. Transportation cost, amount paid or received for the material, and the net total cost or savings of salvage or recycling each material.
    - d. Include manifests, weight tickets, receipts, and invoices as evidence of quantity and cost.
    - e. Certification by receiving party that materials will not be disposed of in landfills or by incineration.
  - 5. Material Reused on Project: Include the following information for each:
    - a. Identification of material and how it was used in the project.
    - b. Amount, in tons or cubic yards.
    - c. Include weight tickets as evidence of quantity.

6. Other Disposal Methods: Include information similar to that described above, as appropriate to disposal method.
- E. Final Waste Management Documentation: Submit at completion of Substantial Completion and prior to contract closeout:
  1. All information required in Monthly Report Submittals.
  2. Legible copies of on-site logs, manifests, weight tickets, and receipts.
  3. Final LEED Form uploaded to LEED Online, including appropriate documentation of total amount (by weight or volume) of diverted construction and demolition waste, and the total amount (by weight or volume) of landfilled waste excluding site clearing.
    - a. MR Credit 2.1 and 2.2, Construction Waste Management.

## **PART 2 PRODUCTS**

### **2.1 PRODUCT SUBSTITUTIONS**

- A. See Section 01 60 00 - Product Requirements for substitution submission procedures.
- B. For each proposed product substitution, submit the following information in addition to requirements specified in Section 01 60 00:
  1. Relative amount of waste produced, compared to specified product.
  2. Cost savings on waste disposal, compared to specified product, to be deducted from the Contract Sum.
  3. Proposed disposal method for waste product.
  4. Markets for recycled waste product.

## **PART 3 EXECUTION**

### **3.1 WASTE MANAGEMENT PROCEDURES**

- A. See Section 01 30 00 for additional requirements for project meetings, reports, submittal procedures, and project documentation.
- B. See Section 01 60 00 for waste prevention requirements related to delivery, storage, and handling.
- C. See Section 01 70 00 for trash/waste prevention procedures related to demolition, cutting and patching, installation, protection, and cleaning.

### **3.2 WASTE MANAGEMENT PLAN IMPLEMENTATION**

- A. Manager: Designate an on-site person or persons responsible for instructing workers and overseeing and documenting results of the Waste Management Plan.
- B. Communication: Distribute copies of the Waste Management Plan to job site foreman, each subcontractor, Owner, Architect, and LEED/Sustainability Consultant.
- C. Instruction: Provide on-site instruction of appropriate separation, handling, and recycling, salvage, reuse, and return methods to be used by all parties at the appropriate stages of the project.
- D. Meetings: Discuss trash/waste management goals and issues at project meetings.
  1. Pre-bid meeting.
  2. Pre-construction meeting.
  3. Regular job-site meetings.
- E. Records: Maintain onsite logs for each load of materials removed from site:
  1. Landfill Log: Include type of material, load (by weight or volume), recycling/hauling service, date accepted by landfill, and facility fee.
  2. Waste Diversion: Include type of material, load (by weight or volume), recycling/hauling service, date accepted by recycling service, or non-profit receiver and facility fee.

3. Where comingling occurs prior to collection, track the amount of construction waste diverted from landfill based on the weight or volume of the removed co-mingled waste and provide the documentation of percentages of recycled from the sorting facility.
- F. Facilities: Provide specific facilities for separation and storage of materials for recycling, salvage, reuse, return, and trash disposal, for use by all contractors and installers.
1. Provide containers as required.
  2. Provide temporary enclosures around piles of separated materials to be recycled or salvaged.
  3. Provide materials for barriers and enclosures that are nonhazardous, recyclable, or reusable to the maximum extent possible; reuse project construction waste materials if possible.
  4. Locate enclosures out of the way of construction traffic.
  5. Provide adequate space for pick-up and delivery and convenience to subcontractors.
  6. If an enclosed area is not provided, clearly lay out and label a specific area on-site.
  7. Keep recycling and trash/waste bin areas neat and clean and clearly marked in order to avoid contamination of materials.
  8. Provide bi-lingual signage.
- G. Hazardous Wastes: Separate, store, and dispose of hazardous wastes according to applicable regulations.
- H. Recycling: Separate, store, protect, and handle at the site identified recyclable waste products in order to prevent contamination of materials and to maximize recyclability of identified materials. Arrange for timely pickups from the site or deliveries to recycling facility in order to prevent contamination of recyclable materials.
1. Coordinate work of recycling, composting and salvaging waste haulers with other trades.
  2. Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall accrue to Contractor.
- I. Reuse of Materials On-Site: Set aside, sort, and protect separated products in preparation for reuse.
- J. Salvage: Set aside, sort, and protect products to be salvaged for reuse off-site.

**END OF SECTION**



**SECTION 017500****COMMISSIONING REQUIREMENTS****PART 1 - GENERAL****1.1 DESCRIPTION**

- A. Commissioning: Commissioning is a systematic process of validating that all building systems perform interactively according to the design intent and the owner's operational needs. This is achieved by beginning in the design phase and documenting design intent and continuing through construction, acceptance and the warranty period with actual verification of performance. The commissioning process shall encompass and coordinate the traditionally separate functions of system documentation, equipment startup, control system calibration, testing and balancing, performance testing and training.

Commissioning during the construction phase is intended to achieve the following specific objectives according to the Contract Documents.

1. Review Owner's Project Requirements (OPR) and the A/E Basis of Design (BOD) documents and ensures Owners requirements are met.
  2. Verify that applicable equipment and systems are installed according to the manufacturer's recommendations and to industry accepted minimum standards and that they receive adequate operational checkout by installing contractors.
  3. Verify and document proper performance of equipment and systems.
  4. Verify that O&M documentation left on site is complete.
  5. Verify that the Owner's operating personnel are adequately trained.
  6. Review trends and seasonal checkout.
- B. The commissioning process does not take away from or reduce the responsibility of the system designers or installing contractors to provide a finished and fully functioning product.
- C. Abbreviations: The following are common abbreviations used in the Specifications and in the Commissioning Plan. Definitions are found in Section 1.6.
1. A/E - Architect and Design Engineers
  2. CxA - Commissioning Authority
  3. CC - Controls Contractor
  4. CA - Construction Administrator (of A/E)
  5. CM - Construction Manager
  6. Cx - Commissioning
  7. Cx Plan - Commissioning Plan Document
  8. EC - Electrical Contractor
  9. FPT - Functional Performance Test
  10. GC - General Contractor
  11. MC - Mechanical Contractor
  12. OPM - Owner's Project Manager (of the Owner)
  13. PFC - Pre-functional Checklist
  14. Subs - Subcontractors to General
  15. TAB - Test, Adjust and Balance Contractor

**1.2 DEFINITIONS**

- A. Commissioning Plan: A document, prepared by the CxA, that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- B. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.

- C. BOD: Basis of Design: A document, prepared by the Architect and Engineers, 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. OPR: Owner's Project Requirements: A document, prepared by the Owner and Architect, that details the functional requirements of the Project and expectations of how it will be used and operated. This document includes Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information

### 1.3 COORDINATION

- A. Commissioning Team: The members of the commissioning team consist of the Commissioning authority (CxA), Construction Manager (CM), the Construction Administrator of Architect and Engineer (A/E), the designated representative of the General Contractor firm (GC or Contractor), the architect and design engineers (particularly the mechanical engineer), the Mechanical Contractor (MC), the Electrical Contractor (EC), the TAB Contractor representative, the Controls Contractor (CC), any other installing subcontractors or suppliers of equipment. If known, the Owner's building or plant operator/engineer is also a member of the commissioning team.
- B. Management: The CxA is hired by the Owner directly. The CxA directs and coordinates the commissioning activities and reports to the A/E. All members work together to fulfill their contracted responsibilities and meet the objectives of the Contract Documents.
- C. C.Scheduling: The GC shall incorporate all commissioning activities into the ICPM and CPM schedules. All parties will address scheduling problems and make necessary notifications in a timely manner in order to expedite the commissioning process. The GC shall notify the CxA of all changes to the schedule affecting commissioning activities immediately after changes occur.
- D. The CxA will provide the general schedule overview of primary commissioning events at the commissioning scoping meeting. The Commissioning Plan - Construction Phase provides a format for this schedule. As the construction progresses, the GC will provide to the CxA and Owner more detailed schedules based on work progress and construction activities. The Cx Plan also provides a format for detailed schedules.

### 1.4 COMMISSIONING PROCESS

- A. Commissioning Plan: The Cx Plan described herein is **binding** on the General Contractor and Subcontractors. The Cx Plan provides guidance in the execution of the commissioning process. The Cx Plan may be adjusted for a specific project after the initial Cx scope meeting. The Specifications will take precedence over the Cx Plan.
- B. Commissioning Process: The following narrative provides a brief overview of the typical commissioning tasks during construction and the general order in which they occur.
  - 1. Commissioning during construction begins with a scoping meeting conducted by the CxA where the commissioning process is reviewed with the commissioning team members.
  - 2. Additional meetings will be required throughout construction, scheduled by the CxA with necessary parties attending, to plan, scope, coordinate, and schedule future activities and resolve problems.
  - 3. Equipment documentation and submittals shall be submitted to the CxA during normal submittal processing, including detailed startup procedures.
  - 4. The CxA works with the Subs in developing pre-functional checklists to be completed during the startup process by the installing contractors.
  - 5. In general, the checkout and performance verification proceeds from simple to complex; from component level to equipment to systems and intersystem levels with pre-functional checklists being completed by the installing contractors and approved by CxA before functional testing.



6. The Subs, under their own direction, execute and document the pre-functional checklists and perform startup and initial checkout procedures, as required by relevant equipment specifications. The Subs shall provide advanced notice of major equipment startups to the CxA, the CxA shall attend equipment startups at their discretion. The Subs submit all completed manufacturer startup forms and pre-functional checklists to the CxA, who documents that the checklists and startup were completed according to the approved plans.
7. The Testing, Adjusting, and Balancing Sub shall complete all work and submit a final TAB report prior to functional performance testing of equipment and systems. This report must be approved by the A/E and CxA.
8. The CxA develops specific equipment and system functional performance test procedures and provides them to the Subs for review.
9. The procedures are executed by the Subs, under the direction of, and documented by, the CxA.
10. Items of non-compliance in material, installation or setup are corrected at the Sub's expense and the system is retested.
11. The CxA reviews the O&M documentation for completeness.
12. Commissioning is completed before substantial completion.
13. The CxA reviews, pre-approves and witnesses the training provided by the Subs and verifies that it was completed. The GC shall coordinate all training, as required.
14. Deferred testing is conducted, as specified or required.

## **1.5 RESPONSIBILITIES**

- A. The responsibilities of various parties in the commissioning process are provided in this Section. The responsibilities of the trade contractors are identified in each Division in addition to this section.
  1. Division 21: Fire Suppression
  2. Division 22: Plumbing.
  3. Division 23: Mechanical.
  4. Division 26: Electrical.
  5. Division 27: Communications.
  6. Division 28: Electronic Safety and Security.
- B. All Parties:
  1. Follow the Commissioning Plan.
  2. Attend commissioning scoping meeting and additional meetings, as requested by the CxA.
- C. Architect (of A/E):
  1. Construction and Acceptance Phase
    - a. Provide support to the Commissioning Team who must provide a service as a part of the commissioning process. This shall include providing adequate space for equipment installation and maintenance.
    - b. Conduct periodic inspections of work in progress to ensure that all systems and equipment are installed according to specifications.
    - c. PM manages the CxA contract for the Owner, including copying the CxA on all relevant documentation and communication.
    - d. Attend the commissioning scoping meeting and selected commissioning team meetings as requested by the CxA.
    - e. Perform normal submittal review, and copy the CxA for construction observations, as-built drawing preparation, O&M manual preparation, etc., as contracted.
    - f. Provide any design narrative documentation requested by the CxA, including BOD and OPR.
    - g. Coordinate resolution of system deficiencies identified during commissioning, according to the contract documents.
    - h. Coordinate resolution of design deficiencies identified during the construction phase.

- i. Prepare and submit final as-built design intent documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.
  - 2. Warranty Period
    - a. Coordinate resolution of design non-conformance and design deficiencies identified during warranty-period commissioning.
- D. Mechanical, Electrical, and Plumbing Designers/Engineers (of the A/E)
  - 1. Construction and Acceptance Phase:
    - a. Provide documentation of initial design concepts, and Design Intent based on the Owner's program.
    - b. Provide mechanical system design parameters and obtain approval of Owner.
    - c. Prepare contract documents incorporating the Commissioning Specification requirements, and description of mechanical system.
    - d. Attend initial meeting with TAB representative as schedules by the Commissioning Authority.
    - e. Review TAB report and verification data sheets for system conformance to contract documents. Issue a report noting deficiencies requiring correction to the Commissioning Authority.
    - f. Review functional performance testing report for deficiencies in meeting the finalized design intent.
    - g. Review as-built records as required by contract documents and turn them over to the CxA for inclusion in the final project documentation.
    - h. Review and comment on the final commissioning report.
    - i. Perform normal submittal review, construction observation, as-built drawing preparation, etc., as contracted. One site observation should be completed just prior to system startup.
    - j. Provide any design narrative and sequences documentation requested by the CxA. The designers shall assist (along with the contractors) in clarifying the operation and control of commissioned equipment in areas where the specifications, control drawings or equipment documentation is not sufficient for writing detailed testing procedures.
    - k. Attend commissioning scoping meetings and other selected commissioning team meetings, as required or requested by CxA.
    - l. Participate in the resolution of system deficiencies identified during commissioning, according to the contract documents.
    - m. Prepare and submit the final as-built design intent and operating parameters documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.
    - n. Sign-off (final approval) on individual commissioning tests as completed and passing. Recommend completion of the commissioning process to the Project Manager.
    - o. Participate in Owner training and provide overview of systems and intended operation.
  - 2. Warranty Period
    - a. Participate in the resolution of non-compliance, non-conformance and design deficiencies identified during commissioning during warranty-period commissioning.
- E. Commissioning Authority (CxA)
  - 1. The CxA is not responsible for design concept, design criteria, compliance with codes, design or general construction scheduling, cost estimating, or construction management. The CxA may assist with problem-solving non-conformance or deficiencies, but ultimately that responsibility resides with the general contractor, subcontractors, and the A/E. The primary role of the CxA is to develop and coordinate the execution of a testing plan, observe and document performance—that systems are functioning in accordance with the

documented design intent and in accordance with the Contract Documents. The Contractors will provide all tools to start, check-out, and functionally test equipment and systems.

2. Construction and Acceptance Phase
  - a. Coordinates and directs the commissioning activities in a logical, sequential and efficient manner using consistent protocols and forms, centralized documentation, clear and regular communications and consultations with all necessary parties, frequently updated timelines, schedules, and technical expertise.
  - b. Coordinate the commissioning work with the PM, GC, and CA, who ensure that commissioning activities are being scheduled into the master schedule.
  - c. Revise, as necessary, the Commissioning Plan - Construction Phase.
  - d. Plan and conduct a commissioning scoping meeting and other commissioning meetings.
  - e. Request and review additional information required to perform commissioning tasks, including O&M manuals, contractor startup and checkout procedures.
  - f. Before startup, gather and review the current control sequences and interlocks and work with contractors and design engineers until sufficient clarity has been obtained, in writing, to be able to write detailed testing procedures.
  - g. Review normal Contractor submittals applicable to systems being commissioned for compliance with commissioning needs, concurrent with the A/E reviews.
  - h. Write and distribute pre-functional tests and checklists.
  - i. Perform site visits to observe component and system installations. Attend selected planning and job-site meetings to obtain information on construction progress. Review construction meeting minutes for revisions/substitutions relating to the commissioning process. Assist in resolving any discrepancies.
  - j. May witness the HVAC&R piping tests and flushing procedures, sufficient to be confident that proper procedures were followed. Notify owner's project manager of any deficiencies in results or procedures.
  - k. May witness ductwork testing and cleaning procedures, sufficient to be confident that proper procedures were followed. Notify owner's project manager of any deficiencies in results or procedures.
  - l. Approve pre-functional tests and checklist completion by reviewing pre-functional checklist reports and by selected site observations and spot checking.
  - m. Verify systems startup by reviewing startup reports and by selected site observation.
  - n. Review TAB execution plan.
  - o. Verify air and water systems balancing by spot testing, by reviewing completed reports, and by selected site observation.
  - p. With necessary assistance and review from installing contractors, write the functional performance test procedures for equipment and systems. This may include energy management control system trending, stand-alone data logger monitoring or manual functional testing. Submit to PM for review, and for approval if required.
  - q. Analyze any functional performance trend logs and monitoring data to verify performance or equipment and systems.
  - r. Coordinate, witness, and approve manual functional performance tests performed by installing contractors. Request retesting as necessary.
  - s. Maintain a master deficiency and resolution log and a separate testing record. Provide the PM with written progress reports and test results with recommended actions.
  - t. Witness the training of the Owner's operating personnel.
  - u. Review of the O&M manuals.
  - v. Provide a final commissioning report (as described in this section).
3. Warranty Period
  - a. Coordinate and witness required Function Performance Testing and deficiency corrections.

- F. Construction Administrator (CA) of Architect and Engineer (A/E)
1. Construction and Acceptance Phase
    - a. Facilitate the coordination of the commissioning work by the CxA for design related components and clarifications, as requested by the CxA.
    - b. Provide support to the Commissioning Team who must provide a service as a part of the commissioning process. This shall include providing adequate space for equipment and maintenance.
    - c. Review and approve the final Commissioning Plan - Construction Phase.
    - d. Attend a commissioning scoping meeting and other commissioning team meetings, as requested by the CxA.
    - e. Perform the normal review of Contractor submittals.
    - f. Furnish a copy of all construction documents, addenda, change orders and approved submittals and shop drawings related to commissioned equipment to the CxA.
    - g. When necessary, observe and witness pre-functional checklists, startup and functional testing of selected equipment.
    - h. Review commissioning progress and deficiency reports.
    - i. Coordinate the resolution of non-compliance and design deficiencies identified in all phases of commissioning.
  2. Warranty Period
    - a. Assist the CxA as necessary in the seasonal or deferred testing and deficiency corrections required by the specifications.
- G. General Contractor (GC)
1. Construction and Acceptance Phase
    - a. Include cost of commissioning requirements in the contract price. In each purchase order or subcontract written, include requirements for submittal data, O&M data, commissioning tasks and training.
    - b. Include commissioning requirements in the mechanical, electrical, plumbing, controls, TAB, and all other sub-contractors contracts, to ensure full cooperation of all parties in the mechanical commissioning program.
    - c. Ensure acceptable representation, with the means and authority to prepare and coordinate execution of the commissioning program as described in the contract documents.
    - d. Submit the following information for each Subcontractor and sub-discipline assigned as representatives to the commissioning team within two weeks of contract award.
      - 1) Company Name
      - 2) Name
      - 3) Years of Experience
      - 4) Phone Number
      - 5) Email address
    - e. Submit a complete list of project submittals required to the Architect by Division 01. The CxA will issue comments directly to the A/E for incorporation into one set of review comments to be issued to the Contractor.
    - f. Submit to the CxA all Division 21, 22, 23, 26, 27, and 28 Quality Control Submittals in accordance with the requirements of individual sections.
    - g. Coordinate with CxA to incorporate all commissioning events in the Master Construction Schedule. The CM and GC shall ensure that all testing requirements for the project are incorporated into the Master Schedule and are distributed to the Owner, CxA, A/E, and all other relevant parties.
    - h. Include the CxA on the construction meeting minutes distribution list.
    - i. Furnish a copy of all construction documents, addenda, change orders, test reports, and approved submittals and shop drawings related to commissioned equipment to the CxA.
    - j. Coordinate all construction meetings requested by the CxA, and ensure all Subcontractors and other applicable parties are in attendance.

- k. Issue a statement that TAB work has been completed, and submit the final TAB reports for review.
  - l. Ensure checklists are completed during construction.
  - m. Provide all manufacturer equipment startup sheets with submittals for each piece of equipment being commissioned.
  - n. Issue a statement that controls systems have been calibrated, and point to point checks have been completed.
  - o. Coordinate the remediation of deficiencies identified in verifications tests, start-ups, pre-functional checklists, punchlists, and other deficiencies noted during construction.
  - p. Facilitate the coordination of the commissioning work by the CxA, and with the Subs to ensure that commissioning activities are being scheduled and being completed based on the master schedule.
  - q. Coordinate as scheduled all subcontractors and startup testing.
  - r. Evaluate any performance deficiencies identified in the FPT report for non-conformance with contract documents.
  - s. Coordinate the preparation of O&M manuals with the installing contractors and Subs, according to the Contract Documents, including clarifying and updating the original sequences of operation to as-built conditions.
  - t. Arrange for facility operating and maintenance personnel to attend various field commissioning activities and field training sessions according to the Commissioning Plan - Construction Phase.
  - u. Provide final approval for the completion of the commissioning work.
2. Warranty Period
- a. Ensure that Subs execute seasonal or deferred functional performance testing, witnessed by the CxA, according to the specifications
  - b. Ensure that Subs correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for applicable issues identified in any seasonal testing

## 1.6 DEFINITIONS

- A. Acceptance Phase - phase of construction after startup and initial checkout when functional performance tests, O&M documentation review and training occurs.
- B. Approval - acceptance that a piece of equipment or system has been properly installed and is functioning in the tested modes according to the Contract Documents.
- C. Architect / Engineer (A/E) - the prime consultant (architect) and sub-consultants who comprise the design team, generally the HVAC mechanical designer/engineer and the electrical designer/engineer.
- D. Basis of Design - The basis of design is the documentation of the primary thought processes and assumptions behind design decisions that were made to meet the design intent. The basis of design describes the systems, components, conditions and methods chosen to meet the intent. Some reiterating of the design intent may be included.
- E. Commissioning Authority (CxA) - an independent agent, not otherwise associated with the A/E team members or the Contractor, though he/she may be hired as a subcontractor to them. The CxA directs and coordinates the day-to-day commissioning activities. The CxA does not take an oversight role like the CA. The CxA shall report directly to the OPM.
- F. Commissioning Plan - an overall plan, developed before or after bidding, that provides the structure, schedule and coordination planning for the commissioning process.
- G. Construction Administrator (CA) – an agent of the A/E, tasked with managing and coordinating the construction process for the Owner, as well as managing the contract of the GC. This individual is a primary recipient of commissioning communication.

- H. Contract Documents - the documents binding on parties involved in the construction of this project (drawings, specifications, change orders, amendments, contracts, Cx Plan, etc.).
- I. Contractor - the general contractor or authorized representative.
- J. Control system - the central building energy management control system.
- K. Data logging - monitoring flows, currents, status, pressures, etc. of equipment using stand-alone data loggers separate from the control system.
- L. Deferred Functional Tests - FPTs that are performed later, after substantial completion, due to partial occupancy, equipment, seasonal requirements, design or other site conditions that disallow the test from being performed.
- M. Deficiency - a condition in the installation or function of a component, piece of equipment or system that is not in compliance with the Contract Documents (that is, does not perform properly or is not complying with the design intent).
- N. Design Narrative or Design Documentation - sections of either the OPR or Basis of Design.
- O. Factory Testing - testing of equipment on-site or at the factory by factory personnel with an Owner's representative present, prior to installation.
- P. Functional Performance Test (FPT) - test of the dynamic function and operation of equipment and systems using manual (direct observation) or monitoring methods. Functional testing is the dynamic testing of systems (rather than just components) under full operation (e.g., the chiller pump is tested interactively with the chiller functions to see if the pump ramps up and down to maintain the differential pressure set point). Systems are tested under various modes, such as during low cooling or heating loads, high loads, component failures, unoccupied, varying outside air temperatures, fire alarm, power failure, etc. The systems are run through all the control system's sequences of operation and components are verified to be responding as the sequences state. Traditional air or water test and balancing (TAB) is not functional testing, in the commissioning sense of the word. TAB's primary work is setting up the system flows and pressures as specified, while functional testing is verifying that which has already been set up. The commissioning authority develops the functional test procedures in a sequential written form, coordinates, oversees and documents the actual testing, which is usually performed by the installing contractor or vendor. FPTs are performed after prefunctional checklists and startup is complete.
- Q. General Contractor (GC) - the prime contractor for this project. Generally refers to all the GC's subcontractors as well. Also referred to as the Contractor in some contexts.
- R. Indirect Indicators - indicators of a response or condition, such as a reading from a control system screen reporting a damper to be 100% closed.
- S. Manual Test - using hand-held instruments, immediate control system readouts or direct observation to verify performance (contrasted to analyzing monitored data taken over time to make the "observation").
- T. Monitoring - the recording of parameters (flow, current, status, pressure, etc.) of equipment operation using data loggers or the trending capabilities of control systems.
- U. Non-Compliance - see Deficiency.
- V. Non-Conformance - see Deficiency.
- W. Over-written Value - writing over a sensor value in the control system to see the response of a system (e.g., changing the outside air temperature value from 50°F to 75°F to verify economizer operation). See also "Simulated Signal."
- X. Owner-Contracted Tests - tests paid for by the Owner outside the GC's contract and for which the CxA does not oversee. These tests will not be repeated during functional tests if properly documented.

- Y. Owner's Project Manager (OPM) - the contracting and managing authority for the owner over the design and/or construction of the project, a staff position. This individual manages and assists the CxA throughout the construction process.
- Z. Owner's Project Requirements (OPR) - a dynamic document that provides the explanation of the ideas, concepts and criteria that are considered to be very important to the owner. It is initially the outcome of the programming and conceptual design phases.
- AA. Phased Commissioning - commissioning that is completed in phases (by floors, for example) due to the size of the structure or other scheduling issues, in order minimize the total construction time.
- BB. Pre-functional Checklist (PFC) - a list of items to inspect, and elementary component tests to conduct, to verify proper installation of equipment, provided by the CxA to the Sub. Pre-functional checklists are primarily static inspections and procedures to prepare the equipment or system for initial operation (e.g., belt tension, oil levels OK, labels affixed, gages in place, sensors calibrated, etc.). However, some pre-functional checklist items entail simple testing of the function of a component, a piece of equipment or system (such as measuring the voltage imbalance on a three phase pump motor of a chiller system). The word pre-functional refers to before functional testing. Pre-functional checklists augment and are combined with the manufacturer's startup checklist. Even without a commissioning process, contractors typically perform some, if not many, of the pre-functional checklist items a commissioning authority will recommend. However, few contractors document in writing the execution of these checklist items. Therefore, for most equipment, the contractors execute the checklists on their own. The commissioning authority only requires that the procedures be documented in writing, and does not witness much of the pre-functional check listing, except for larger or more critical pieces of equipment.
- CC. Sampling - functionally testing only a fraction of the total number of identical or near identical pieces of equipment.
- DD. Seasonal Performance Tests - SFT's that are deferred until the system(s) will experience conditions closer to their design conditions.
- EE. Simulated Condition - condition that is created for the purpose of testing the response of a system (e.g., applying a hair blower to a space sensor to see the response in a VAV box).
- FF. Simulated Signal - disconnecting a sensor and using a signal generator to send an amperage, resistance or pressure to the transducer and DDC system to simulate a sensor value.
- GG. Specifications - the construction specifications of the Contract Documents.
- HH. Startup - the initial starting or activating of dynamic equipment, including executing pre-functional checklists.
- II. Subs - the subcontractors to the GC who provide and install building components and systems.
- JJ. Test Procedures - the step-by-step process which must be executed to fulfill the test requirements. The test procedures are developed by the CxA.
- KK. Test Requirements - requirements specifying what modes and functions, etc. shall be tested. The test requirements are not the detailed test procedures. The test requirements are specified in the Contract Documents (Sections XX 08 00 for each Division).
- LL. Trending - monitoring using the building control system.
- MM. Vendor - supplier of equipment.
- NN. Warranty Period - warranty period for entire project, including equipment components. Warranty begins at Substantial Completion and extends for at least one year, unless specifically noted otherwise in the Contract Documents and accepted submittals.
- OO. 20 08 XX - Series of drawings or specification sections to be commissioned.

**1.7 SYSTEMS TO BE COMMISSIONED**

- A. The systems to be commissioned in the project include but are not limited to:
  - 1. Division 21: FIRE SUPPRESSION COMMISSIONING, SECTION 210800
  - 2. Division 22: PLUMBING COMMISSIONING, SECTION 220800
  - 3. Division 23: HVAC COMMISSIONING, SECTION 230800
  - 4. Division 26: ELECTRICAL COMMISSIONING, SECTION 260800
  - 5. Division 27: COMMUNICATIONS COMMISSIONING, SECTION 270800
  - 6. Division 28: SAFETY AND SECURITY COMMISSIONING, SECTION 280800
- B. Refer to each Section in each Division listed above for specific installation and performance verification testing requirements. Each Division has commissioning sections specific to the applicable trades work.

**PART 2 - PRODUCTS****2.1 TEST EQUIPMENT**

- A. All standard testing equipment required to perform startup and initial checkout and required functional performance testing shall be provided by the Division contractor for the equipment being tested. For example, the mechanical contractor of Division 23 shall ultimately be responsible for all standard testing equipment for the HVAC system and controls system in Division 23, except for equipment specific to and used by TAB in their commissioning responsibilities. Two-way radios, ladders and access to equipment shall be provided by the Division Contractor(s).
- B. Special equipment, tools and instruments (only available from vendor, specific to a piece of equipment) required for testing equipment, according to these Contract Documents shall be included in the base bid price to the Contractor and left on site.
- C. All testing equipment shall be of sufficient quality and accuracy to test and/or measure system performance within the tolerances specified in the Specifications. If not otherwise noted, the following minimum requirements apply: Temperature sensors and digital thermometers shall have a certified calibration within the past year to an accuracy of 0.5°F and a resolution of + or - 0.1°F. Pressure sensors shall have an accuracy of + or - 2.0% of the value range being measured (not full range of meter) and have been calibrated within the last year. All equipment shall be calibrated according to the manufacturer's recommended intervals and when dropped or damaged. Calibration tags shall be affixed or certificates readily available.
- D. Refer to Section 017500, Part 3 for details regarding equipment that may be required to simulate required test conditions.

**PART 3 - EXECUTION****3.1 MEETINGS**

- A. Scoping Meeting: Within 60 days of commencement of construction, the CxA will schedule, plan and conduct a commissioning scoping meeting with the entire commissioning team in attendance. Meeting minutes will be distributed to all parties by the CxA. Information gathered from this meeting will allow the CxA to revise the Draft 2 Commissioning Plan to its "final" version, which will also be distributed to all parties.
- B. Miscellaneous Meetings: Other meetings will be planned and conducted by the CxA as construction progresses. These meetings will cover coordination, deficiency resolution and planning issues with particular Subs. The CxA will plan these meetings and will minimize unnecessary time being spent by Subs. For this project, these meetings may be held monthly, until the final months of construction when they may be held as frequently as one per week at the discretion of the CxA (typically 4 months prior to completion of construction).



**3.2 REPORTING**

- A. The CxA will provide regular reports to the A/E, GC, Owner, and CM with increasing frequency as construction and commissioning progresses.
- B. The CxA will regularly communicate with all members of the commissioning team, keeping them apprised of commissioning findings through progress reports, emails, etc.
- C. Testing or review approvals and non-conformance and deficiency reports are made regularly with the review and testing as described in later sections.

**3.3 SUBMITTALS**

- A. At minimum, the Submittal Documentation will include the manufacturer and model number, the manufacturer's printed installation and detailed startup procedures, full sequences of operation, O&M data, performance data, any performance test procedures, control drawings and details of owner contracted tests, in addition to any specific requirements from the equipment specifications sections. Optional accessories and equipment not provided for the project shall not be shown in submittals and IOMs. In addition, the installation and checkout materials that are actually shipped inside the equipment and the actual field checkout sheet forms to be used by the factory or field technicians shall be submitted to the CxA. All documentation requested by the CxA will be included by the Subs in their O&M manual contributions.
- B. The CxA will review submittals related to the commissioned equipment for conformance to the Contract Documents as it relates to the commissioning process, to the functional performance of the equipment and adequacy for developing test procedures. This review is intended primarily to aid in the development of functional testing procedures and only secondarily to verify compliance with equipment specifications. The CxA will notify the OPM or A/E as requested, of items missing or areas that are not in conformance with Contract Documents and which require resubmission.
- C. The CxA may request additional design narrative from the A/E and Controls Contractor, depending on the completeness of the OPR documentation and sequences provided with the Specifications.
- D. These submittals to the CxA do not constitute compliance for O&M manual documentation. The O&M manuals are the responsibility of the Contractor, though the CxA will review them.

**3.4 PRE-FUNCTION CHECKLISTS, STARTUP AND INITIAL CHECKOUT**

- A. The following procedures apply to all equipment to be commissioned, according to Section 1.7, Systems to be Commissioned.
- B. General: Pre-functional checklists are important to ensure that the equipment and systems are hooked up and operational. It ensures that functional performance testing (in-depth system checkout) may proceed without unnecessary delays. Each piece of equipment receives full pre-functional checkout. No sampling strategies are used. The pre-functional testing for a given system must be successfully completed prior to formal functional performance testing of equipment or subsystems of the given system. Completion of all pre-functional checklists is a requirement of Substantial Completion.
- C. Startup and Initial Checkout Plan: The primary role of the CxA in this process is to compile all documentation verifying the manufacturer-recommended procedures have been completed. Parties responsible for pre-functional checklists and startup are identified in the commissioning scoping meeting and in the checklist forms. Parties responsible for executing functional performance tests are identified in the testing requirements in Sections XX 08 00 and other sections where tests requirements are found.
  - 1. The CxA adapts, if necessary, the representative pre-functional checklists and procedures. These checklists indicate required procedures to be executed as part of startup and initial checkout of the systems and the party responsible for their execution.

2. These checklists and tests are provided by the CxA to the Contractor. The Contractor determines which trade is responsible for executing and documenting each of the line item tasks and notes that trade on the form.
  3. The subcontractor responsible for the purchase of the equipment develops the full startup plan by combining (or adding to) the CxA's checklists with the manufacturer's detailed startup and checkout procedures from the O&M manual and the normally used field checkout sheets. The plan will include checklists and procedures with specific boxes or lines for recording and documenting the checking and inspections of each procedure and a summary statement with a signature block at the end of the plan.
  4. The subcontractor submits the full startup plan to the CxA for review.
  5. The CxA reviews the procedures and the format for documenting them, noting any procedures that need to be added.
  6. The full startup procedures and the approval form may be provided to the CM for review and approval, depending on management protocol.
- D. Sensor and Actuator Calibration
1. All field-installed temperature, relative humidity, CO, CO<sub>2</sub> and pressure sensors and gauges, and all actuators (dampers and valves) on all equipment shall be calibrated using the methods described below. Alternate methods may be used, if approved by the Owner before-hand. All test instruments shall have had a certified calibration within the last 12 months. Sensors installed in the unit at the factory with calibration certification provided need not be field calibrated.
  2. All procedures used shall be fully documented on the pre-functional checklists or other suitable forms, clearly referencing the procedures followed and written documentation of initial, intermediate and final results.
  3. Sensor Calibration Methods
    - a. All Sensors. Verify that all sensor locations are appropriate and away from causes of erratic operation. Verify that sensors with shielded cable are grounded only at one end. For sensor pairs that are used to determine a temperature or pressure difference, make sure they are reading within 0.2°F of each other for temperature and within a tolerance equal to 2% of the reading of each other, for pressure. Tolerances for critical applications may be tighter.
    - b. Sensors Without Transmitters--Standard Application. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system (BAS)) is within the tolerances in the table below of the instrument-measured value. If not, install offset in BAS, calibrate or replace sensor.
    - c. Sensors With Transmitters--Standard Application. Disconnect sensor. Connect a signal generator in place of sensor. Connect ammeter in series between transmitter and BAS control panel. Using manufacturer's resistance-temperature data, simulate minimum desired temperature. Adjust transmitter potentiometer zero until 4 mA is read by the ammeter. Repeat for the maximum temperature matching 20 mA to the potentiometer span or maximum and verify at the BAS. Record all values and recalibrate controller as necessary to conform with specified control ramps, reset schedules, proportional relationship, reset relationship and P/I reaction. Reconnect sensor. Make a reading with a calibrated test instrument within 6 inches of the site sensor. Verify that the sensor reading (via the permanent thermostat, gage or building automation system (BAS)) is within the tolerances in the table below of the instrument-measured value. If not, replace sensor and repeat. For pressure sensors, perform a similar process with a suitable signal generator.
    - d. Tolerances, Standard Applications

<u>Sensor</u>	<u>Required Tolerance (+/-)</u>
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Cooling coil, chilled and condenser water temps	0.5F
AHU wet bulb or dew point	0.5F
Hot water coil and boiler water temp	0.5F
Outside air, space air, duct air temps	0.5F
Watt hour, voltage & amperage	1%
Pressures, air, water and gas	2%
Flow rates, air	5%
Flow rates, water	4% of design
Relative humidity	3% of design
Combustion flue temps	4.0F
Oxygen or CO <sub>2</sub> monitor	0.1 % pts
CO monitor	0.01 % pts
Barometric pressure	0.1 in. of Hg

4. Valve and Damper Stroke Set-up and Check

- a. EMS Readout: For all valve and damper actuator positions checked, verify the actual position against the BAS readout.
- b. Set pumps or fans to normal operating mode. Command valve or damper closed, visually verify that valve or damper is closed and adjust output zero signal as required. Command valve or damper open, verify position is full open and adjust output signal as required. Verify fail-safe operation. Command valve or damper to a few intermediate positions. If actual valve or damper position doesn't reasonably correspond, replace actuator or add pilot positioner (for pneumatics).
- c. Closure for heating coil valves (NO): Set heating set point 20°F above room temperature. Observe valve open. Remove control air or power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set heating set point to 20°F below room temperature. Observe the valve close. For pneumatics, by override in the EMS, increase pressure to valve by 3 psi (do not exceed actuator pressure rating) and verify valve stem and actuator position does not change. Verify fail-safe operation. Restore to normal.
- d. Closure for cooling coil valves (NC): Set cooling set point 20°F above room temperature. Observe the valve close. Remove control air or power from the valve and verify that the valve stem and actuator position do not change. Restore to normal. Set cooling set point to 20°F below room temperature. Observe valve open. For pneumatics, by override in the EMS, increase pressure to valve by 3 psi (do not exceed actuator pressure rating) and verify valve stem and actuator position does not change. Verify fail-safe operation. Restore to normal.

E. Execution of Pre-functional Checklists and Startup

1. Four weeks prior to startup, the Subs and vendors schedule startup and checkout with the CM/GC, A/E, and CxA. The performance of the pre-functional checklists, startup and checkout are directed and executed by the Sub or vendor. When checking off pre-functional checklists, signatures may be required of other Subs for verification of completion of their work.
2. The CxA may observe the procedures for each piece of primary equipment, the contractor shall provide two weeks advance notice to the CxA prior to commencing startup procedures.
3. For lower-level components of equipment, (e.g., VAV boxes, sensors, controllers), the CxA shall observe a sampling of the pre-functional and startup procedures, at their discretion.
4. The Subs and vendors shall execute startup and provide the CxA with a signed and dated copy of the completed startup and pre-functional tests and checklists.

5. Only individuals that have direct knowledge and witnessed that a line item task on the pre-functional checklist was actually performed shall initial or check that item off. It is not acceptable for non-witnessing personnel to fill out these forms.
  6. Sampling strategies by the contractor are not acceptable for startup and pre-functional checklists.
- F. Deficiencies, Non-Conformance and Approval in Checklists and Startup
1. The Subs shall clearly list any outstanding items of the initial startup and pre-functional procedures that were not completed successfully, at the bottom of the procedures form or on an attached sheet. The procedures form and any outstanding deficiencies are provided to the CxA within two days of test completion.
  2. The CxA reviews the report and submits either a non-compliance report or an approval form to the CM and GC. The CxA shall work with the Subs and vendors to correct and retest deficiencies or uncompleted items. The CxA will involve the CM, GC, and others as necessary. The installing Subs or vendors shall correct all areas that are deficient or incomplete in the checklists and tests in a timely manner, and shall notify the CxA as soon as outstanding items have been corrected and resubmit an updated startup report and a Statement of Correction on the original non-compliance report. When satisfactorily completed, the CxA recommends approval of the execution of the checklists and startup of each system to the CM using a standard form.
  3. Items left incomplete, which later cause deficiencies or delays during functional testing may result in back charges to the responsible party. Refer to Part 3.7 herein for details.

### 3.5 PHASED COMMISSIONING

- A. The project may require startup and initial checkout to be executed in phases. This phasing will be planned and scheduled in a coordination meeting of the CxA, CM, Mechanical Contractor, TAB Contractor, Controls Contractor, Electrical Contractor, and other disciplines, as required. Results will be added to the master and commissioning schedule.

### 3.6 FUNCTIONAL PERFORMANCE TESTING

- A. This sub-section applies to all commissioning functional testing for all divisions.
- B. The general list of equipment to be commissioned is found in Section 017500, Part 1.7
- C. The parties responsible to execute each test are listed with each test in other sections where test requirements are found.
- D. Objectives and Scope: The objective of functional performance testing is to demonstrate that each system is operating according to the documented Owner's Project Requirements and Contract Documents. Additionally, during the testing process, areas of deficient performance are identified and corrected, improving the operation and functioning of the systems. In general, each system should be operated through all modes of operation (seasonal, occupied, unoccupied, warm-up, cool-down, part- and full-load) where there is a specified system response. Verifying each sequence in the sequences of operation is required. Proper responses to such modes and conditions as power failure, freeze condition, low oil pressure, no flow, equipment failure, etc. shall also be tested. Specific modes required in this project are given in Sections XX 08 00 and other sections where test requirements are found.
- E. Development of Test Procedures: Before test procedures are written, the CxA shall obtain all requested documentation and a current list of change orders affecting equipment or systems, including an updated points list, program code, control sequences and parameters. Using the testing parameters and requirements in other sections where test requirements are found, the CxA shall develop specific test procedures and forms to verify and document proper operation of each piece of equipment and system. Each Sub or vendor responsible to execute a test shall provide assistance to the CxA in developing the procedures review (answering questions about equipment, operation, sequences, etc.). Prior to execution, the CxA shall provide a copy of the test procedures to the Sub(s) who shall review the tests for feasibility, safety, equipment and

warranty protection. The CxA may submit the tests to the A/E for review, if requested. The purpose of any given specific test is to verify and document compliance with the stated criteria of acceptance given on the test form.

- F. Representative test formats and examples (not designed for this project) are found in the Section 23 08 19. The test procedure forms developed by the CxA shall include (but not be limited to) the following information:
1. System and equipment or component name(s)
  2. Equipment location and ID number
  3. Unique test ID number, and reference to unique pre-functional checklist and start-up documentation ID numbers for the piece of equipment
  4. Date
  5. Project name
  6. Participating parties
  7. A copy of the specification section describing the test requirements
  8. A copy of the specific sequence of operations or other specified parameters being verified
  9. Formulas used in any calculations
  10. Required pre-test field measurements
  11. Instructions for setting up the test.
  12. Special cautions, alarm limits, etc.
  13. Specific step-by-step procedures to execute the test, in a clear, sequential and repeatable format
  14. Acceptance criteria of proper performance with a Yes/No check box to allow for clearly marking whether or not proper performance of each part of the test was achieved
  15. A section for comments
  16. Signatures and date block for the CxA
- G. Test Methods
1. Functional performance testing and verification may be achieved by manual testing (persons manipulate the equipment and observe performance) or by monitoring the performance and analyzing the results using the control system's trend log capabilities or by stand-alone data loggers. The CxA may substitute specified methods or require an additional method to be executed, other than what was specified, with no additional cost to the Owner. The CxA will determine which method is most appropriate for tests that do not have a method specified.
  2. Simulated Conditions: Simulating conditions (not by an overwritten value) shall be allowed, though timing the testing to experience actual conditions is encouraged wherever practical.
  3. Overwritten Values: Overwriting sensor values to simulate a condition, such as overwriting the outside air temperature reading in a control system to be something other than it really is, shall be allowed, but shall be used with caution and avoided when possible. Such testing methods often can only test a part of a system, as the interactions and responses of other systems will be erroneous or not applicable. Simulating a condition is preferable. e.g., for the above case, by heating the outside air sensor with a heat gun, rather than overwriting the value or by altering the appropriate set point to see the desired response. Before simulating conditions or overwriting values, sensors, transducers and devices shall have been calibrated.
  4. Simulated Signals: Using a signal generator which creates a simulated signal to test and calibrate transducers and DDC constants is generally recommended over using the sensor to act as the signal generator via simulated conditions or overwritten values.
  5. Altering Set points: Rather than overwriting sensor values, and when simulating conditions is difficult, altering set points to test a sequence is acceptable. For example, to see the AC compressor lockout work at an outside air temperature below 55°F, when the outside air temperature is above 55°F, temporarily change the lockout set point to be 2°F above the current outside air temperature.
  6. Indirect Indicators: Relying on indirect indicators for responses or performance shall be allowed only after visually and directly verifying and documenting, over the range of the tested parameters, that the indirect readings through the control system represent actual

conditions and responses. Much of this verification is completed during pre-functional testing.

7. Set-up: Each function and test shall be performed under conditions that simulate actual conditions as close as is practically possible. The Sub executing the test shall provide all necessary materials, system modifications, etc. to produce the necessary flows, pressures, temperatures, etc. necessary to execute the test according to the specified conditions. At completion of the test, the Sub shall return all affected building equipment and systems, due to these temporary modifications, to their pre-test condition.
8. Sampling: Multiple identical pieces of non-life-safety or otherwise non-critical equipment may be functionally tested using a sampling strategy. Significant application differences and significant sequence of operation differences in otherwise identical equipment invalidates their common identity. A small size or capacity difference, alone, does not constitute a difference. The specific recommended sampling rates are specified with each type of equipment in Sections XX 08 00. It is noted that no sampling by Subs is allowed in pre-functional checklist execution.
  - a. A common sampling strategy referenced in the Specifications as the “xx% Sampling—yy% Failure Rule” is defined by the following example.
    - 1) xx = the percent of the group of identical equipment to be included in each sample.
    - 2) yy = the percent of the sample that if failing, will require another sample to be tested.
  - b. The example below describes a 20% Sampling—10% Failure Rule.
    - 1) Randomly test at least 20% (xx) of each group of identical equipment. In no case test less than three units in each group. This 20%, or three, constitute the “first sample.”
    - 2) If 10% (yy) of the units in the first sample fail the functional performance tests, test another 20% of the group (the second sample).
    - 3) If 10% of the units in the second sample fail, test all remaining units in the whole group.
    - 4) If at any point, frequent failures are occurring and testing is becoming more troubleshooting than verification, the CxA may stop the testing and require the responsible Sub to perform and document a checkout of the remaining units, prior to continuing with functionally testing the remaining units.
- H. Coordination and Scheduling: The Subs shall provide two (2) week notice to the CxA regarding their completion schedule for the pre-functional checklists and startup of all equipment and systems. The CxA will schedule functional tests through the CM and GC. The CxA shall direct, witness and document the functional testing of all equipment and systems. The Subs shall execute the tests.
- I. In general, functional testing is conducted after pre-functional testing and startup has been satisfactorily completed. The control system shall be sufficiently tested and approved by the CM or GC before it is used for TAB or to verify performance of other components or systems. The air balancing and water balancing is completed and debugged before functional testing of air-related or water-related equipment or systems. Testing proceeds from components to subsystems to systems. When the proper performance of all interacting individual systems has been achieved, the interface or coordinated responses between systems is checked.
- J. Test Equipment: Refer to Section 017500, Part 2 for test equipment requirements.
- K. Problem Solving: The CxA will recommend solutions to problems found, however the burden of responsibility to solve, correct and retest problems is with the GC, Subs and A/E.

### **3.7 DOCUMENTATION, NON-CONFORMANCE AND APPROVAL OF TESTS**

- A. Documentation: The CxA shall witness and document the results of all functional performance tests using the specific procedural forms developed for that purpose. Prior to testing, these forms are provided to the CM for review and approval and to the Subs for review. The CxA will include

the filled out forms in the O&M manuals. Forms may be amended and modified by the CxA at any time with no additional cost to the Owner.

B. Non-Conformance:

1. The CxA will record the results of the functional test on the procedure or test form. All deficiencies or non-conformance issues shall be noted and reported to the CM and GC on the Commissioning Issues Log.
2. Corrections of minor deficiencies identified may be made during the tests at the discretion of the CxA. In such cases the deficiency and resolution will be documented on the procedure form.
3. Every effort will be made to expedite the testing process and minimize unnecessary delays, while not compromising the integrity of the procedures. However, the CxA will not be pressured into overlooking deficient work or loosening acceptance criteria to satisfy scheduling or cost issues, unless there is an overriding reason to do so at the request of the CM or Owner.
4. As tests progress and a deficiency is identified, the CxA discusses the issue with the executing contractor.
  - a. When there is no dispute on the deficiency and the Sub accepts responsibility to correct it:
    - 1) The CxA documents the deficiency and the Sub's response and intentions and they go on to another test or sequence. After the day's work, the CxA reports the deficiency on the Commissioning Issues Log to the CM and GC. A copy is provided to the Sub. The Sub corrects the deficiency, signs a statement of correction certifying that the equipment is ready to be retested and sends it back to the CxA.
    - 2) The CxA reschedules the test and the test is repeated.
  - b. If there is a dispute about a deficiency, regarding whether it is a deficiency or who is responsible:
    - 1) The deficiency shall be documented on Commissioning Issues Log with the Sub's response and a copy given to the CM, GC, and to the Sub representative assumed to be responsible.
    - 2) Resolutions are made at the lowest management level possible. Other parties are brought into the discussions as needed. Final interpretive authority is with the CxA. Final acceptance authority is with the Project Manager and Owner.
    - 3) The CxA documents the resolution process.
    - 4) Once the interpretation and resolution have been decided, the appropriate party corrects the deficiency, signs the statement of correction on the non-compliance form and provides it to the CxA. The CxA reschedules the test and the test is repeated until satisfactory performance is achieved.
5. Cost of Retesting
  - a. The cost for the Sub to retest a functional test, if they are responsible for the deficiency, shall be theirs. If they are not responsible, any cost recovery for retesting costs shall be negotiated with the GC.
  - b. For a deficiency identified, not related to any pre-functional checklist or startup fault, the following shall apply: The CxA and GC will direct the retesting of the equipment once for a total of 8 hours maximum at no "charge" to the GC for their time. However, the CxA's and GC's time for a second retest or for retesting exceeding 8 hours will be charged to the GC, who may choose to recover costs from the responsible Sub.
  - c. The time for the CxA and GC to direct any retesting required because a specific pre-functional checklist or startup test item, reported to have been successfully completed, but determined during functional testing to be faulty, will be back charged to the GC, who may choose to recover costs from the party responsible for executing the faulty pre-functional test.
  - d. Refer to the sampling section of Section 017500, Part 3 for requirements for testing and retesting identical equipment.

6. The Contractor shall respond in writing to the CxA and CM within two weeks concerning the status of each apparent outstanding discrepancy identified during commissioning. Discussion shall cover explanations of any disagreements and proposals for their resolution.
  7. Any required retesting by any contractor shall not be considered a justified reason for a claim of delay or for a time extension by the GC.
- C. Failure Due to Manufacturer Defect: If 10%, or three, whichever is greater, of identical pieces (size or capacity alone does not constitute a difference) of equipment fail to perform to the Contract Documents (mechanically or substantively) due to manufacturing defect, not allowing it to meet its submitted performance requirements, all identical units may be considered unacceptable by the CM. In such case, the Contractor shall provide the Owner with the following:
1. Within one week of notification from the CM, the Contractor or manufacturer's representative shall examine all other identical units making a record of the findings. The findings shall be provided to the CM within two weeks of the original notice.
  2. Within two weeks of the original notification, the Contractor or manufacturer shall provide a signed and dated written explanation of the problem, cause of failures, etc. and all proposed solutions which shall include full equipment submittals. The proposed solutions shall not significantly exceed the specification requirements of the original installation.
  3. The CM will determine whether a replacement of all identical units or a repair is acceptable.
  4. Two examples of the proposed solution will be installed by the Contractor and the PM will be allowed to test the installations for up to one week, upon which the CM will decide whether to accept the solution.
  5. Upon acceptance, the Contractor and/or manufacturer shall replace or repair all identical items at their expense and extend the warranty accordingly, if the original equipment warranty had begun. The replacement/repair work shall proceed with reasonable speed beginning within one week from when parts can be obtained.
- D. Approval: The CxA notes each satisfactorily demonstrated function on the test form. Formal approval of the functional test is made later after review by the CxA and by the CM, if necessary. The CxA recommends acceptance of each test to the CM using a standard form. The CM gives final approval on each test using the same form, providing a signed copy to the CxA and the Contractor.

### 3.8 OPERATION AND MAINTENANCE MANUALS

- A. Standard O&M Manuals
1. In addition to requirements of other Sections. Provide CxA with electronic and one (1) hard copy of O&Ms for concurrent review with A/E and Owner.
  2. The specific content and format requirements for the standard O&M manuals are detailed in Section 013300 and the Owner requirements, in addition to specific equipment and system specifications.
  3. A/E Contribution: The A/E will include in the beginning of the O&M manuals a separate section describing the systems including:
    - a. The design intent narrative prepared by the A/E and provided as part of the bid documents, updated to as-built status by the A/E.
    - b. Simplified professionally drawn single line system diagrams on 8 1/2" x 11" or 11" x 17" sheets. These shall include chillers, water system, condenser water system, heating system, supply air systems, exhaust systems and heaters. These shall show major pieces of equipment such as pumps, chillers, boilers, control valves, expansion tanks, coils, service valves, etc.
  4. CxA Review and Approval: The CxA shall review the O&M manuals, documentation and redline as-builts for systems that were commissioned and other systems documentation that the CxA should review, to verify compliance with the Specifications. The CxA will communicate deficiencies in the manuals to the CM or A/E, as requested. Upon a successful review of the corrections, the CxA recommends approval and acceptance of these sections of the O&M manuals to the CM or A/E. The CxA also reviews each



equipment warranty and verifies that all requirements to keep the warranty valid are clearly stated. This work does not supersede the A/E's review of the O&M manuals according to the A/E's contract.

5. Refer to Sections 017823, 013300 and equipment specific Sections for other O&M requirements.

### **3.9 TRAINING OF OWNER PERSONNEL**

- A. The GC shall be responsible for training coordination and scheduling and ultimately for ensuring that training is completed.
- B. The CxA shall be responsible for overseeing and approving the content and adequacy of the training of Owner personnel for commissioned equipment.
  1. The GC shall interview the facility manager and lead engineer to determine the special needs and areas where training will be most valuable.
  2. The Owner and CxA shall decide how rigorous the training should be for each piece of commissioned equipment. The minimum requirements for acceptance of training will include training on operation of equipment in all modes, and all equipment specific maintenance procedures required by the manufacturer or industry standards.
  3. In addition to these general requirements, the specific training requirements of Owner personnel by Subs and vendors is specified in Division 21, 22, 23, 26, 27 and 28, and other sections where training requirements are found.
  4. Each Sub and vendor responsible for training will submit a written training plan to the CxA for review and approval two weeks prior to training. The plan will cover the following elements:
    - a. Equipment (included in training)
    - b. Intended audience
    - c. Location of training
    - d. Objectives
    - e. Subjects covered (description, duration of discussion, special methods, etc.)
    - f. Duration of training on each subject
    - g. Instructor for each subject
    - h. Methods (classroom lecture, video, site walk-through, actual operational demonstrations, written handouts, etc.)
    - i. Instructor and qualifications
    - j. A sign in sheet shall be provided for each training session and shall be furnished to the owner with the final O&M Manuals.
    - k. A survey of training participants shall be included for each training session and provided to the Owner and CxA within two weeks of training sessions.
  5. For the primary HVAC equipment, the Controls Contractor shall provide a discussion of the control of the equipment during the mechanical or electrical training conducted by others.
  6. The CxA reviews the overall training plan and coordinates and schedules with the CM and Owner, the overall training for the commissioned systems. The CxA develops criteria for determining that the training was satisfactorily completed, including attending some of the training, etc. The CxA recommends approval of the training to the A/E using a standard form. The CM also signs the approval form.
  7. Videotaping of all training sessions will be provided by the GC with CD's cataloged by the GC, and added to the O&M manuals.
  8. The mechanical design engineer shall, at the first training session, present the overall system design concept and the design concept of each equipment section. This presentation shall include a review of all systems using the simplified system schematics (one-line drawings) including chilled water systems, condenser water or heat rejection systems, heating systems, supply air systems, exhaust system and outside air strategies.

**3.10 DEFERRED TESTING**

- A. Unforeseen Deferred Tests: If any check or test cannot be completed due to the building structure, required occupancy condition or other deficiency, execution of checklists and functional testing may be delayed upon approval of the CM. These tests will be conducted in the same manner as the seasonal tests as soon as possible. Services of necessary parties will be negotiated

**END OF SECTION 017500**

**SECTION 01 7700 – CLOSEOUT PROCEDURES****PART 1- GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
1. Substantial Completion.
  2. Final Completion.
  3. All Permit close outs
  4. Warranties.
  5. Record Documents.
  6. Operation and Maintenance data and manuals.
  7. Training of Owner's personnel.
  8. Spare Parts and Attic Stock Material
  9. Final cleaning.
- B. Related Sections include the following:
1. Division 1 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
  2. Division 1 Section "Execution Requirements" for progress cleaning of Project site.
  3. Divisions 2 through 33 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

**1.3 SUBSTANTIAL COMPLETION**

- A. General: Refer to General Conditions Article 14.2.
- B. Procedures: Before requesting Architect/Engineer and Owner inspection for determining Substantial Completion, the following items must be completed.
1. Perform a complete inspection of the Work. Prepare a list of items to be completed and/or corrected (punch list), the value of items on the list, and reasons why the Work is not complete. All Contract Work not completed at time of Substantial Completion shall be maintained by the Contractor until accepted by Owner.
  2. Submit specific warranties, workmanship bonds, operation and maintenance manuals, maintenance service agreements, final certifications, and similar documents.
  3. Release/closeout of all permits, including Sediment Control, Public Right-of-Way and Parks.
  4. Prepare and submit Project Record Documents, operation and maintenance manuals, Final Completion construction photographs, damage or settlement surveys, property surveys, and similar final record information.
  5. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.
  6. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
  7. Complete startup testing of systems.
  8. Submit test/adjust/balance records.

9. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
  10. Advise Owner of changeover in heat and other utilities.
  11. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
  12. Complete final cleaning requirements, including touchup painting.
  13. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.
  14. Complete functional performance testing.
  15. List of names and contact information for Contractor's and subcontractors' personnel responsible for issues related to warranties and maintenance agreements.
  16. Submit contract-required attic stock along with a list of all materials and products.
- C. List of Incomplete Items (Punch List)
1. Submit copies of punch list simultaneously to the Owner and Architect/Engineer. 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.
  2. Organize list of spaces in sequential order, starting with exterior areas first.
  3. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems. Provide graphic representation of location where that is determined to be helpful.
  4. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Page number.
  5. Punch List must be work that can be completed within 30 days as required by the Contract.
- D. Architect/Engineer and Owner Inspection and Approval: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect/Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements which contractor must complete before Substantial Completion inspections can proceed. Architect/Engineer will prepare and sign the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect/Engineer, that must be completed or corrected before certificate will be issued. After Owner receipt of a Certificate of Substantial Completion signed by the Architect/Engineer and Contractor, the Owner will determine whether to accept based on its review, observations and knowledge. The Owner's signature approval of the Certificate of Substantial Completion executes the Certificate. In reviewing the Certificate, the Owner may, but is not obligated to, rely on the signature approval of the Architect/Engineer in determining Contract compliance.
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.

#### 1.4 FINAL COMPLETION

- A. General: Refer to General Conditions Article 14.3.
- B. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:

1. Submit a final Application for Payment according to Section 01 2900 "Payment Procedures."
  2. Submit certified copy of Architect/Engineer's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect/Engineer. The certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.
  3. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
  4. Submit pest-control final inspection report and warranty.
  5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems.
  6. Provide documentation certifying closeout of all permits.
- C. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect/Engineer will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect/Engineer 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. In processing the Certificate, the Owner may, but is not obligated to, rely on the signature approval of the Architect/Engineer in determining Contract compliance.
1. Re-inspection: Request re-inspection when the Work identified in previous inspections as incomplete is completed or corrected.

## 1.5 WARRANTIES

- A. Provide all properly executed warranties prior to, or with, request for Substantial Completion. Warranties for any item on the punchlist will not go into effect until that item is completed or until final completion.
- B. Partial Occupancy: All designated partial portions of the Work that are occupied or used by the Owner during the construction period shall be maintained by the Contractor as required by the manufacturer/installer so that the warranty term of coverage will begin only when the project is accepted at Substantial Completion or Final Completion if on the punchlist.
- C. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.
  1. Bind warranties and bonds in heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11inch paper.
  2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address, and telephone number of both Installer and manufacturer.
  3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
  4. Provide Owner with three (3) hard copies and three (2) electronic copies (disk).
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

## 1.6 RECORD DOCUMENTS

- A. General:
  1. Maintain one copy of Contract Documents and each submittal during the construction period for Project Record Document purposes.

2. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.
  3. Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Provide files and racks for secure storage. Do not use Project Record Documents for construction purposes.
  4. 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 Owner's and Architect/Engineer's reference during working hours.
  5. Submit final Record Documents to Architect/Engineer at time of Substantial Completion. Record documents include, but not limited to:
    - a. Record Drawings:
      - 1) Contract drawings – marked-up
      - 2) Shop drawings – marked-up
      - 3) Newly prepared drawings
    - b. Specifications – marked-up
    - c. Product Data submittals– marked up
    - d. Record Samples
    - e. Addenda and Change Orders
    - f. Field records for variable and concealed conditions
    - g. Record information on Work that is recorded only schematically
- B. Record Drawings: Maintain at site one updated and current set of annotated project Record Drawings from project Notice-to-Proceed until Completion of the Work. Keep set available for use and inspection by Architect/Engineer and Owner. Submit completed set of Record Drawings to Architect/Engineer prior to Final Completion.
1. Maintain one set of blue- or black-line white prints of all of the Contract Drawings and Shop Drawings. Mark Record Drawings 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 prepare the marked-up Record Drawings.
    - 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 understandable drawing technique.
    - c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.
  2. Content: Types of items requiring marking include, but are not limited to, the following:
    - a. Dimensional changes to Drawings.
    - b. Revisions to details shown on Drawings.
    - c. Depths of foundations below first floor.
    - k. Locations and depths of underground utilities.
    - l. Revisions to routing of piping and conduits.
    - m. Revisions to electrical circuitry.
    - n. Actual equipment locations.
    - o. Duct size and routing.
    - p. Locations of concealed internal utilities.
    - q. Changes made by Contract Modification, Change Order or Field Order.
    - r. Revisions made following Architect/Engineer's Supplemental Instructions.
    - s. Details not on the original Contract Drawings.
    - t. Field records for variable and concealed conditions.
    - u. Record information on the Work that is shown only schematically.

3. Mark completely and accurately the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. Where Shop Drawings are marked, show cross-reference on the Contract Drawings.
  4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
  5. Mark important additional information that was either shown schematically or omitted from original Drawings.
  6. Note numbers of Field Orders, Alternates, Change Orders, and Supplemental Instructions, and similar revisions, where applicable.
  7. Prepare new Drawings instead of preparing Record Drawings where Architect/Engineer determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
    - a. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
    - b. Consult Architect/Engineer for proper scale and scope of detailing and notations required to record the actual physical installation and its relation to other construction. Integrate newly prepared Record Drawings into Record Drawing sets; comply with procedures for formatting, organizing, copying, binding, and submitting.
  8. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location. Organize Record Drawings including newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
- C. Record Specifications: Maintain at site one updated and current set of annotated project Record specifications, including addenda, field orders, and contract modifications, from project Notice-to-Proceed until Completion of the Work. Keep set available for use and inspection by Architect/Engineer and Owner. Submit completed set of Record Specifications to Architect/Engineer prior to Final Completion.
1. Mark Specifications to indicate the actual product installation where installation varies from that indicated in Specifications, addenda, and contract modifications.
  2. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  3. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
  4. Note related Change Orders, Record Product Data, and Record Drawings where applicable.
- D. Record Product Data: Submit one annotated copy of each Product Data submittal prior to Final Completion. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual, instead of submittal as Record Product Data, prior to Substantial Completion.
1. Maintain samples in clean dry condition; do not use for construction purposes.
  2. Mark Product Data to indicate the actual product installation where installation varies substantially from that indicated in Product Data submittal.
  3. Give particular attention to information on concealed products and installations that cannot be readily identified and recorded later.
  4. Include significant changes in the product delivered to Project site and changes in manufacturer's written instructions for installation.
  5. Note related Change Orders, Record Specifications, and Record Drawings where applicable.
- E. Miscellaneous Record Submittals: 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.

## 1.7 OPERATION AND MAINTENANCE DATA AND MANUALS

### A. Operation and Maintenance Documentation Directory

1. Organization: Include a section in the directory for each of the following:
  - a. List of documents.
  - b. List of systems.
  - c. List of equipment.
  - d. Table of contents.
2. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system. System is defined as: An organized collection of parts, equipment, or subsystems united by regular interaction. Subsystem is a portion of a system with characteristics similar to a system.
3. 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.
4. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.
5. 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."
6. Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

### B. Manuals, General

1. Provide three (3) hard copy sets and one (1) electronic copy of all Owner approved manuals. Review each manual for accuracy and completeness before submitting.
2. 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.
  - a. 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.
  - b. Binders: Heavy-duty, 3-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets. Use as many binders, up to 3" thick, as necessary to avoid overloading of binders.
    - 1) If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.
    - 2) Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
  - c. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab with non-erasable ink to indicate contents. Include typed list of products and major components of equipment included in the section on each



- divider, cross-referenced to Specification Section number and title of Project Manual.
- d. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
  - e. Each manual shall contain the following materials, in the order listed:
    - 1) Cover page.
    - 2) Table of contents. 3)  
Manual contents.
3. Cover Page: Enclose cover page in transparent plastic sleeve. Include the following information:
- a. Subject matter included in manual.
  - b. Name and address of Project.
  - c. Name and address of Owner.
  - d. Date of submittal.
  - e. Name, address, and telephone number of Contractor.
  - f. Name and address of Architect/Engineer.
  - g. Cross-reference to related systems in other operation and maintenance manuals.
4. 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.
- a. 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.
5. Manual Contents:
- a. System Description: Provide general overall of system or subsystem covered by the manual.
  - b. Submittal and Product Data: Include all final approved submittal data. If submittal was not required for review, include descriptive product data.
  - c. Equipment Supplier: Include the name, address and telephone number of the manufacturer's agent and/or service agency supplying or installing and starting up of the equipment.
  - d. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
    - 1) Prepare supplementary text on 8-1/2-by-11-inch white bond paper if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
  - e. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams.
    - 1) Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
    - 2) Attach reinforced, punched binder tabs on drawings and bind with text. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
    - 3) If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations. Do not

use original Project Record Documents as part of operation and maintenance manuals.

- f. Final Pre-Functional Checklists: These checklists are to be completed by the Contractor, in accordance with the Commissioning Plan.
- g. Parts List: edited to omit reference to items which do not apply to this installation.
- h. Coordination: Where operation and maintenance documentation includes information on installations by more than one factory-authorized service representative, assemble and coordinate information furnished by representatives and prepare manuals.
- i. Schedule: Submit three copies, and the quantity of return copies required by the Contractor, by the completion date of equipment placement. All operations manuals must be approved (i.e. submitted, reviewed by Architect/Engineer, corrected, and approved by the Architect/Engineer) prior to Substantial Completion. **SUBSTANTIAL COMPLETION WILL NOT BE GRANTED WITHOUT APPROVED OPERATION AND MAINTENANCE MANUALS.**
  - 1) Include a complete operation and maintenance directory.
  - 2) Correct or modify each manual to comply with Architect/Engineer's comments.
  - 3) Submit 3 copies of each corrected manual within 15 days of receipt of Architect/Engineer's comments.

C. Operation Manuals

- 1. Assemble a complete set of operation information indicating proper operation of each system, subsystem, and piece of equipment not part of a system.
  - a. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  - b. Prepare a separate manual for each system and subsystem, in the form of an instructional manual, for use by Owner's operating personnel
  - c. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
  - d. System, subsystem, and equipment descriptions.
  - e. Performance and design criteria if Contractor is delegated design responsibility.
  - f. Operating standards.
  - g. Operating procedures.
  - h. Operating logs.
  - i. Wiring diagrams.
  - i. Control diagrams.
  - j. Piped system diagrams.
  - k. Precautions against improper use.
  - l. License requirements including inspection and renewal dates.
- 2. Descriptions: Include the following:
  - a. Product name and model number.
  - b. Manufacturer's name.
  - c. Equipment identification with serial number of each component.
  - d. Equipment function.
  - e. Operating characteristics.
  - f. Limiting conditions.
  - g. Performance curves.
  - h. Engineering data and tests.
  - i. Complete nomenclature and number of replacement parts.
- 3. Operating Procedures: 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. Instructions on stopping.
    - f. Normal shutdown instructions.
    - g. Seasonal and weekend operating instructions.
    - h. Required sequences for electric or electronic systems.
    - i. Special operating instructions and procedures.
  4. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.
  5. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.
- D. Product Maintenance Manuals
  1. Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
  2. 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.
  3. 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.
  4. Product Information: Include the following, as applicable:
    - a. Product name and model number.
    - b. Manufacturer's name.
    - c. Color, pattern, and texture.
    - d. Material and chemical composition.
    - e. Reordering information for specially manufactured products.
  5. Maintenance Procedures: Include manufacturer's written recommendations and 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. Schedule for routine cleaning and maintenance.
    - e. Repair instructions.
  6. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.
  7. Warranties and Bonds: Include three copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
    - a. Include procedures to follow and required notifications for warranty claims.
- E. Systems and Equipment Maintenance Manuals
  1. Assemble a complete set of maintenance data indicating maintenance of each system, subsystem, and piece of equipment not part of a system.
    - a. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
    - b. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's maintenance personnel
  2. 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.

3. 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.
4. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
  - a. Standard printed maintenance instructions and bulletins.
  - b. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
  - c. Identification and nomenclature of parts and components.
  - d. List of items recommended to be stocked as spare parts.
5. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
  - a. Test and inspection instructions.
  - b. Troubleshooting guide.
  - c. Precautions against improper maintenance.
  - d. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  - e. Aligning, adjusting, and checking instructions.
  - f. Demonstration and training videotape, if available.
6. 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.
  - a. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  - b. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
7. 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.
8. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
9. Warranties and Bonds: Include three copies of warranties, maintenance bonds, and Maintenance service contracts as specified in various Specification Sections. Provide lists of circumstances and conditions that would affect validity of warranties or bonds.
  - a. Include procedures to follow and required notifications for warranty claims.

F. Emergency Manuals

1. Content: Organize manual into a separate section for each of the following:
  - a. Type of emergency.
  - b. Emergency instructions.
  - c. Emergency procedures.

2. 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:
  - a. Fire.
  - b. Water leak.
  - c. Power failure.
  - d. Water outage.
  - e. System, subsystem, or equipment failure.
3. 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.
4. Emergency Procedures: Include the following, as applicable:
  - a. Instructions on stopping.
  - b. Shutdown instructions for each type of emergency.
  - c. Operating instructions for conditions outside normal operating limits.
  - d. Required sequences for electric or electronic systems.
  - e. Special operating instructions and procedures.

#### 1.8 TRAINING OF OWNER'S PERSONNEL

- A. Program Structure: Develop and implement an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections. Owner shall be given comprehensive training in the understanding of the systems and the operation and maintenance of each major piece of equipment.
  1. Coordinate content of training modules with content of approved emergency, operation, and maintenance manuals. Do not submit instruction program until operation and maintenance data has been reviewed and approved by Architect/Engineer.
  2. Coordinate scheduling of training with Commissioning Authority. Provide coordination with Contractor personnel, subcontractors, suppliers, and manufacturer's representatives for the efficient scheduling of instruction.
  3. Submit two copies of outline of instructional program for demonstration and training, including 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.
  4. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season. Schedule training with Owner, through Architect/Engineer, with at least seven days' advance notice. Coordinate and adjust schedule to minimize disrupting Owner's operations.
  5. Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, their schedules and course content, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
    - a. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that

indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

6. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.
  7. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
    - a. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 1 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
  8. Set up instructional equipment, including the use of overhead projectors, sliders, videos, and audio taped material, at instruction location.
- 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:
1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
    - a. System, subsystem, and equipment descriptions.
    - b. Performance and design criteria if Contractor is delegated design responsibility.
    - c. Operating standards.
    - d. Regulatory requirements.
    - e. Equipment function.
    - f. Operating characteristics.
    - g. Limiting conditions.
    - h. Performance curves.
  2. Documentation: Review the following items in detail:
    - a. Emergency manuals.
    - b. Operations manuals.
    - c. Maintenance manuals.
    - d. Project Record Documents.
    - e. Identification systems.
    - f. Warranties and bonds.
    - g. Maintenance service agreements and similar continuing commitments.
  3. Emergencies: Include the following, as applicable:
    - a. Instructions on meaning of warnings, trouble indications, and error messages.
    - b. Instructions on stopping.
    - c. Shutdown instructions for each type of emergency.
    - d. Operating instructions for conditions outside of normal operating limits.
    - e. Sequences for electric or electronic systems.
    - f. Special operating instructions and procedures.
  4. Operations: Include the following, as applicable:
    - a. Startup 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.
9. Attendance and Evaluation: For each training module, submit list of participants and length of instruction time. At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test. For each participant and for each training module, submit results and documentation of performance-based test.
10. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before training.
11. At completion of training, submit one (1) complete hard copy and one (1) complete electronic training manual(s) for Owner's use.
12. Schedule: All Owner training shall be completed prior to Substantial Completion. SUBSTANTIAL COMPLETION WILL NOT BE GRANTED WITHOUT COMPLETION OF OWNER TRAINING.

## 1.9 SPARE PARTS AND ATTIC STOCK MATERIAL

- A. Provide spare parts and extra (attic) stock materials in quantities specified in individual Specification Sections.
- B. Deliver to Project site and place in locations as directed; obtain receipt from Owner's representative.
- C. Submit document, at or before time of request for inspection for Substantial Completion, listing items and quantities of each; attach receipts.

## 1.10 FINAL CLEANING

- A. General: Provide final cleaning just prior to Substantial Completion. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.
- B. 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.
- C. 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 portion of Project:
    - a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscaped areas, free of rubbish, waste material, litter, obstructions 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, dust, films, and similar foreign substances.
    - g. Clean resilient flooring, stone flooring, tile, pavers and other similar hard interior surfaces including associated bases. Refer to individual manufacturer's recommendations and requirements for sealing, buffing, waxing and polishing.
    - h. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
    - i. Sweep concrete floors broom clean in unoccupied spaces.
    - j. Vacuum carpet and similar soft surfaces, removing debris, soil and excess nap. Shampoo to remove any visible soil or stains remaining after vacuuming.
    - k. Clean transparent and reflective materials, including mirrors and glass in doors and windows, to clear shine. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped, scratched or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
    - l. Remove labels that are not required as permanent labels.



- m. Touch up and otherwise repair and restore marred, exposed finishes and surfaces. Replace finishes and surfaces that cannot be satisfactorily repaired or restored or that already show evidence of repair or restoration.
    - 1) Do not paint over "UL" and similar labels, including mechanical and electrical nameplates.
  - n. Clean exposed surfaces of mechanical, electrical, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
  - o. Replace parts subject to unusual operating conditions.
  - p. Clean plumbing fixtures, drinking fountains, and similar equipment, to a sanitary condition, free of stains, including stains resulting from water exposure.
  - q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency. Replace burned-out bulbs, and those noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.
  - r. Leave Project clean and ready for occupancy.
  - s. Avoid disturbing natural weathering of exterior surfaces.
- E. Heating, Ventilating, and Air Conditioning Systems:
- 1. Clean permanent filters and replace disposable filters for units operated during construction. Clean exposed surfaces of diffusers, registers, and grills.
  - 2. Clean ducts, blowers, and coils for units operated without filters during construction.
- F. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Submit a report prepared by the exterminator indicating successful completion of this work.
- G. Comply with safety standards and manufacturer's instructions for cleaning. Do not burn waste materials. Do not bury debris or excess materials on Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from Project site and dispose of lawfully.

**PART 2 - PRODUCTS**

NOT USED

**PART 3 - EXECUTION**

NOT USED

**- END OF SECTION 01 7700 -**



**SECTION 018113**  
**SUSTAINABLE DESIGN REQUIREMENTS**

**PART 1 - GENERAL**

**1.1 DESCRIPTION**

- A. This section includes general requirements and procedures for compliance with certain U.S. Green Building Council's (USGBC) Leadership in Energy and Environmental Design, LEED®NC Version 2009, credits and prerequisites. Achievement of the prerequisites and credits identified in this section will be sufficient for the Project to obtain the equivalent of a LEED Rating of Silver.
1. Fulfillment of LEED prerequisite and credit requirements identified in this section is a requirement of the Project.
  2. Other LEED prerequisites and credits needed to obtain LEED Equivalence are dependent on material selections and may not be specifically identified as LEED requirements. Compliance with requirements needed to obtain LEED prerequisites and credits may be used as one criterion to evaluate substitution requests.
  3. Additional LEED prerequisites and credits needed to obtain the indicated LEED Equivalence are dependent on the Architect's design, and other aspects of the Project that are not part of the Work of the Contract.
  4. The design team has developed a list of LEED credits that appear achievable for this project; the credit requirements have been incorporated into design documents. The target LEED checklist is included as an attachment to this Section.
  5. The Design Team LEED Consultant will take overall responsibility for compiling LEED documentation for the project. The General Contractor is responsible for gathering documentation required for the points identified in this section; individual subcontractors are responsible for documenting products and processes as identified in this section and relevant specific sections.
  6. Contractor shall follow LEED requirements in conjunction with requirements specified in all other Sections and refer any discrepancies to the Architect for clarification.
  7. Comply with requirements of ASTM E1971 for construction and final cleaning. Refer to Section 017400.
  8. Enforce "No Smoking" zone within building construction and to a distance of 25 feet or more from building construction.
- B. Related Sections
1. Divisions 01 through 49 Sections for LEED requirements specific to the Work of each of those Sections. These requirements may or may not include specific reference to LEED.
  2. All other sections where indicated.
  3. Section 017419 for Construction Waste Management and Disposal.

**1.2 REFERENCE STANDARDS**

- A. BAAQMD Regulation 8, Rule 51 – Bay Area Air Quality Management District Adhesive and Sealant Products.
- B. GS 11 – Green Seal VOC Guidelines for Paints.
- C. GS 37 – Green Seal Environmental Standard for General Purpose Cleaning Materials, March 2005.
- D. SCAQMD Rule # 1168 –South Coast Air Quality Management District Adhesive and Sealant Applications.
- E. SMACNA IAQ Guideline for Occupied Buildings Under Construction, 1995, Chapter 3.
- F. USGBC LEED - United States Green Building Council Leadership in Energy and Environmental Design Rating System for New Construction, Version 2009.

### 1.3 DEFINITIONS

- A. Agrifiber Product: Products consisting of fibrous material derived from the agricultural industry and typically characterized by rapidly renewable characteristics. Such products may consist of wheat straw, sugar cane, and other agricultural crops.
- B. Biobased Materials: Fuels, chemicals, building materials, or electric power or heat produced from biomass as defined by the Biomass Research and Development Act of 2000. Minimum biobased content shall be as defined by the US Department of Agriculture pursuant to the US Farm Bill May 2002.
  - 1. Biobased content: The weight of the biobased material divided by the total weight of the product and expressed as a percentage by weight.
- C. Chain-of-Custody: Process whereby a product or material is maintained under the physical possession or control during its entire life cycle.
- D. Chlorofluorocarbons (CFCs): Any of various halocarbon compounds consisting of carbon, hydrogen, chlorine, and fluorine, once used widely as aerosol propellants and refrigerants. Chlorofluorocarbons have been identified to cause depletion of the atmospheric ozone layer.
- E. Cost Basis: A basis of calculation wherein the input values are in terms of monetary cost (US Dollar).
- F. Environmentally preferable products: Products and materials that promote stewardship of the earth's resources, promote good indoor environmental quality (IEQ), and promote efficiencies in operational performance. Environmentally preferable products:
  - 1. Preserve or renew biodiversity and ecosystems.
  - 2. Maximize use of biobased and recycled content materials.
  - 3. Maintain or improve water quality and promote water stewardship.
  - 4. Maximize use of non-toxic, non-hazardous, healthy and safe building materials.
- G. LEED: Leadership in Energy & Environmental Design.
- H. Non-Renewable Resource: A resource that exists in a fixed amount in various places in the earth's crust and that cannot be replenished on a human time scale. Non-renewable resources have the potential for renewal only by geological, physical, and chemical processes taking place over hundreds of millions to billions of years. Examples include: iron ore, portland cement, copper, aluminum, coal, and oil.
- I. Perpetual Resource: A resource that is virtually inexhaustible on a human time scale. Examples include solar energy, tidal energy, and wind energy.
- J. Postconsumer Material: Material generated by households or commercial, industrial, and institutional facilities in their role as end-users of the product which can no longer be used for its intended purpose.
- K. Preconsumer Material: Material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.
- L. Precautionary Approach: An effort to modify the manufacture, marketing or use of products services, or the conduct of activities, consistent with scientific and technical understanding, to prevent serious or irreversible environmental degradation. Refer to ISO 14004: 1996 for additional clarification.
- M. Rapidly Renewable Materials: Materials made from agricultural products that are typically harvested within a ten-year or shorter cycle. Rapidly renewable materials include products made from bamboo, cotton, flax, jute, straw, sunflower seed hulls, vegetable oils, or wool.
- N. Regionally Manufactured Materials: Materials that are manufactured within a radius of 800 km [(500 miles)] from the Project location. Manufacturing refers to the final assembly of components into the building product that is installed at the Project site.

- O. Regionally Extracted, Harvested, or Recovered Materials: Materials that are extracted, harvested, or recovered and manufactured within a radius of 500 miles from the Project site. Regionally recovered materials include materials made from recycled products where the recycled material was recovered within 500 miles.
- P. Recycled Content Materials: Products that contain preconsumer or post-consumer materials as all or part of their feedstock. Recycled content claim shall be consistent with Federal Trade Commission (FTC) Guide for the Use of Environmental Marketing Claims.
- Q. Recycled Content: The percentage by weight of constituents that have been recovered or otherwise diverted from the solid waste stream, either during the manufacturing process pre-consumer), or after consumer use (post-consumer).
  - 1. Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product are not recycled materials.
  - 2. Discarded materials from one manufacturing process that are used as constituents in another manufacturing process are pre-consumer recycled materials.
  - 3. Recycled content materials claims shall meet the following requirements:
    - a. Defined in accordance with the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e).
    - b. The recycled content of each material shall be provided for the percentage by weight of post-consumer and pre-consumer content, as defined in the document referenced above, used in each product type used.
- R. Solar Reflectance Index (SRI): A measure of a materials ability to reject solar heat, as shown by a small temperature rise. It is defined so that a standard black (reflectance 0.05, emittance 0.90) is 0 and a standard white (reflectance 0.80, emittance 0.90) is 100. Materials with the highest SRI values are the coolest choices for roofing.
- S. Stewardship: Responsible use and management of resources in support of sustainability.
- T. Sustainability: The maintenance of ecosystem components and functions for future generations.
- U. Volatile Organic Compounds (VOC's): Carbon compounds emitted by materials that participate in atmospheric photochemical reactions. VOC's are common in building products and are emitted over time through outgassing. Sources of VOC's may include solvents in paints and other coatings; wood preservatives; strippers and household cleaners; adhesives in particleboard, fiberboard, and some plywoods; and foam insulation.
- V. Weight Basis: A basis of calculation wherein the input values are in terms of weight (US Pound).

#### **1.4 GENERAL REQUIREMENTS**

- A. Contractor shall designate LEED Representative. LEED Representative shall be an individual responsible for implementation, coordination, and documentation of LEED Credit Requirements specified herein. LEED Representative shall lead all LEED Certification meetings as stipulated in Section 013100 and shall be present on site at all times when work is in progress.
- B. The Contractor shall keep at least one copy of the LEED 2009 Reference Guide and LEED Letter Templates (latest version) at the project site at all times. Copy can be obtained through [www.USGBC.org](http://www.USGBC.org) website.
- C. All LEED submittal information shall be in hardcopy and electronic format, including digital photographs. Final submission to USGBC shall be by wet-signed hardcopy and electronic versions of the letter template files.

#### **1.5 MEETINGS**

- A. Contractor shall schedule and conduct LEED Certification meetings. A schedule of LEED Certification meetings shall be submitted to the Architect for review within 30-calendar days of date established for commencement of work for each phase of construction. At the Architect's discretion, the LEED Certification meetings may be combined with other Project meetings. Meeting attendees shall include:
  - 1. Contractor's Project Manager

2. Owner's Representatives
  3. Trade Contractor's LEED Representative
  4. All other attendees designated by Architect
  5. Sub-Contractor Representatives as appropriate to stage of work
- B. Meetings shall be held at least once a month.
- C. LEED Certification goals and issues shall be discussed at the following meetings:
1. Pre-construction Conference.
  2. Project Progress Meetings.

#### **1.6 SUBMITTALS**

- A. General: Submit additional LEED and Sustainable submittal requirements included in other sections of the Specifications.
- B. LEED submittals are in addition to other submittals. If submitted item is identical to that submitted to comply with other requirements, submit duplicate copies as a separate submittal to verify compliance with indicated LEED requirements.
- C. Refer to Section 013300 for additional LEED submittal requirements.
- D. When documentation or written affidavits from manufacturers are required to show compliance with a LEED prerequisite or credit, Manufacturer literature (such as cutsheets, print-outs from the manufacturer's website, or MSDS sheets) or statements on manufacturers letterhead certifying the stated product attribute must be submitted. Confirmation from vendors and email correspondence will not be acceptable. Submit LEED submittals independently from construction submittals and with separate Transmittal form.
- E. Project Materials Cost Data: Provide statement indicating total cost for building materials used for Project. Include statement indicating total cost of mechanical and electrical components.
- F. LEED Action Plans: Provide preliminary submittals within 30 days of date established for commencement of the Work indicating how the following requirements will be met.
1. A list of the potential materials to track is provided in the Materials Tracking List (provided in Exhibit 3 of this section). A sample Materials Tracking Form demonstrating the specific information needed for each product is also provided in the Appendix of this section.
  2. Credit MR 2: Waste management plan complying with Section 017419 "Construction Waste Management."
  3. Credit MR 3 List of proposed salvaged and refurbished materials.
    - a. Identify each material that will be salvaged or refurbished, its source, and cost.
  4. Credit MR 4: List of proposed materials with recycled content.
    - a. Indicate cost, post-consumer recycled content, and pre-consumer recycled content for each product having recycled content.
    - b. A list of the potential materials to track is provided in the Materials Tracking List (provided in Exhibit 3 of this section). A sample Materials Tracking Form demonstrating the specific information needed for each product is also provided in the Appendix of this section.
  5. Credit MR 5: List of proposed regionally manufactured materials and regionally extracted, harvested, or recovered materials.
    - a. Identify each regionally manufactured material, its source, and cost.
    - b. Identify each regionally extracted, harvested or recovered material, its source, and cost.
    - c. A list of the potential materials to track is provided in the Materials Tracking List (provided in Exhibit 3 of this section). A sample Materials Tracking Form demonstrating the specific information needed for each product is also provided in the Appendix of this section.
  6. Credit MR 7: List of proposed certified wood products.
    - a. Indicate each product containing certified wood, its source, and cost.
    - b. Include statement indicating total cost for wood-based materials used for Project, including non-rented temporary construction.

- c. Include any wood formwork which was purchased for the project.
- 7. Credit EQ 3.1: Construction indoor air quality management plan (see example in Exhibit 2).
  - a. Highlight compliance with recommended Design Approaches in Sheet Metal and Air Conditioning National Contractors Association (SMACNA) IAQ Guideline for Occupied Buildings under Construction, 2007, Chapter 3.
  - b. Describe intended use of HVAC systems during construction, if any, and use of filtration media as required by LEED.
- G. LEED Progress Reports: Concurrent with each Application for Payment, submit reports comparing actual construction and purchasing activities with LEED action plans for the following:
  - 1. Credit MR 2: Waste reduction progress reports
  - 2. Credit MR 3: Salvaged and refurbished materials
  - 3. Credit MR 4: Recycled content.
  - 4. Credit MR 5: Regionally extracted, processed, and manufactured materials.
- H. LEED Documentation Submittals:
  - 1. Credit SS 7.2: Product Data for roofing materials indicating compliance with LEED SRI requirements.
  - 2. Credit SS 8: Product Data for interior and exterior lighting fixtures that stop direct-beam illumination from leaving the building site. Provide site photometrics showing no greater than 0.01 horizontal and vertical footcandles 10 feet beyond site boundary.
  - 3. Credit WE 2 and 3: Product Data for plumbing fixtures indicating water consumption.
  - 4. Prerequisite EA 3: Product Data for new HVAC&R equipment indicating absence of CFC refrigerants.
  - 5. Credit EA 4: Product Data for new HVAC equipment indicating compliance with LEED refrigerant selection requirements.
  - 6. Credit EA 5: Product Data and wiring diagrams for sensors and data collection system used to provide continuous metering of building energy and water consumption performance over time. Provide a copy of the Measurement and Verification Plan in accordance with the International Performance Measurement & Verification Protocol (IPMVP) Vol III: Concepts and Options for Determining Energy Savings in New Construction, April, 2003.
  - 7. Credit MR 2: Comply with Division 01 Section "Construction Waste Management."
  - 8. Credit MR 3: Receipts for salvaged and refurbished materials used for Project, indicating sources and costs for salvaged and refurbished materials.
  - 9. Credit MR 4:
    - a. Product Data and certification letter indicating percentages by weight of post-consumer and pre-consumer recycled content for products having recycled content. Include statement indicating costs for each product having recycled content.
    - b. Letter Template as appropriate to submittal content with actual values input.
  - 10. Credit MR 5:
    - a. Product Data indicating location of material manufacturer for regionally manufactured materials.
      - 1) Include statement indicating cost, and distance from manufacturer to Project for each regionally manufactured material.
      - 2) Include statement indicating cost, and distance from point of extraction, harvest, or recovery to Project for each raw material used in regionally manufactured materials.
      - 3) Mechanical, electrical, and plumbing components and specialty items such as elevators and equipment shall not be included in this calculation. Furniture may be included, providing it is included consistently in MRc 3 through 7. Formwork is included in the total materials cost only if it is purchased for the project and not used elsewhere; formwork that is reused can be counted as equipment and excluded from the calculation. Formwork must be included or excluded consistently in MRc 3 through 7.
    - b. Letter Template as appropriate to submittal content with actual values input.
  - 11. Credit MR 6: Product Data for rapidly renewable materials.
    - a. Include statement indicating costs for each rapidly renewable material.

12. Credit MR 7:
  - a. Product Data and certificates of chain-of-custody for products containing certified wood.
  - b. Include statement indicating costs for each product containing wood-.
  - c. Include statement indicating total cost for wood-based materials used for Project, including non-rented temporary construction.
  - d. Letter Template as appropriate to submittal content with actual values input.
13. Credit EQ 1: Product Data and Shop Drawings for ventilation monitoring system.
14. Credit EQ 3.1:
  - a. Construction indoor air quality management plan. (see sample in Exhibit 2)
  - b. Product data for temporary filtration media.
  - c. Product Data for filtration media used during occupancy.
  - d. Construction Documentation: Six photographs at three different occasions during construction along with a brief description of the SMACNA approach employed, documenting implementation of the IAQ management measures, such as protection of ducts and on-site stored or installed absorptive materials.
  - e. Letter Template as appropriate to submittal content.
15. Credit EQ 3.2:
  - a. Signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed and statement that filtration media was replaced after flush-out.
  - b. Letter Template as appropriate to submittal content.
16. Credit EQ 4.1:
  - a. Product Data for adhesives and sealants used on the interior of the building indicating VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D (EPA method 24).
  - b. Letter Template as appropriate to submittal content
17. Credit EQ 4.2:
  - a. Product Data for paints and coatings used on the interior of the building indicating chemical composition and VOC content of each product used. Indicate VOC content in g/L calculated according to 40 CFR 59, Subpart D (EPA method 24).
  - b. Letter Template as appropriate to submittal content.
18. Credit EQ 4.3: Product Data for carpet and hard surface flooring products indicating VOC content of each product used and compliance with the requirements of the Carpet and Rug Institute's Green Label Plus program and FloorScore standard for low-emitting flooring material, respectively.
19. Credit EQ 4.4: Product Data for composite wood and agrifiber products indicating that products contain no urea-formaldehyde resin.
  - a. Include statement indicating adhesives and binders used for each product.
  - b. Letter Template as appropriate to submittal content
20. Credit EQ 5: Product Data for filtration media used during flush-out and during occupancy.
21. Credit EQ 6.1 Product Data and Shop Drawings for controls used to provide lighting for minimum 90% of building occupants in regularly occupied spaces.
22. Credit EQ 6.2: Product Data and Shop Drawings for sensors and control system used to provide individual airflow and temperature controls for minimum 50 percent of non-perimeter, regularly occupied space.
23. Credit EQ 7.1 and 7.2: Product Data and Shop Drawings for sensors and control system used to monitor and control room temperature and humidity.

## 1.7 SUBSTITUTIONS

- A. Requests for substitutions shall comply with the provisions of Section 012500, with the following additional information required where LEED requirements are specified. Trade Contractor shall:
  1. Demonstrate as per the requirements of this Section that proposed substitution complies with VOC emission limits.



2. Demonstrate as per the requirements of this Section that proposed substitution complies with requirements for recycled content.
3. Demonstrate as per the requirements of this Section that proposed substitution complies with any further section specific LEED compliance requirements applicable to substitution.
4. Trade Contractor shall include on the transmittal sheet of each request for substitution the relevant LEED credit number.

## **PART 2 - PRODUCTS**

### **2.1 CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL**

- A. Credit MR 2: Divert 75 percent of construction material waste and site clearing debris from disposal in landfill or incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites.
- B. Refer to Section 017419 Construction Waste Management for additional requirements.

### **2.2 RECYCLED CONTENT MATERIALS**

- A. Credit MR 4: Provide building materials with recycled content such that the sum of post-consumer recycled content plus one-half of pre-consumer recycled content constitutes a minimum of 20 percent of the cost of materials used for the Project.
  1. The cost of post-consumer recycled content of an item shall be determined by dividing the weight of post-consumer recycled content in the item by the total weight of the item and multiplying by the cost of the item.
  2. The cost of post consumer recycled content plus one-half of pre-consumer recycled content of an item shall be determined by dividing the weight of post-consumer recycled content plus one-half of pre-consumer recycled content in the item by the total weight of the item and multiplying by the cost of the item.
  3. Do not include mechanical and electrical components, or labor and equipment, in the calculation.
  4. Recycled content of materials shall be defined according to the Federal Trade Commission's "Guide for the Use of Environmental Marketing Claims," 16 CFR 260.7 (e).

### **2.3 REGIONAL MATERIALS**

- A. Credit MR 5: Provide 20 percent of building materials (by cost) that are regionally extracted, processed, and manufactured materials.
- B. Provide building materials (by cost) that are extracted, harvested or recovered AND manufactured within a 500 mile radius of the project. If only a fraction of the materials is extracted/harvested/recovered and manufactured locally, then only that percentage (by weight) shall contribute to the regional value.
- C. Do not include mechanical, plumbing or electrical components, or labor, installation or equipment in the calculation.

### **2.4 RAPIDLY RENEWABLE MATERIALS**

- A. Credit MR 6: Provide rapidly renewable building materials and products (made from plants that are typically harvested within a ten-year cycle of shorter) for 2.5 percent (by cost) of all building materials and products used in the Project.

### **2.5 CERTIFIED WOOD**

- A. Credit MR 7: Provide a minimum of 50 percent (by cost) of wood-based materials that are produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC 1.2, "Principles and Criteria."
  1. Wood-based materials include but are not limited to the following materials when made from made wood, engineered wood products, or wood-based panel products:
    - a. Rough carpentry.
    - b. Miscellaneous carpentry.

- c. Heavy timber construction.
- d. Wood decking.
- e. Metal-plate-connected wood trusses.
- f. Structural glued-laminated timber.
- g. Finish carpentry.
- h. Architectural woodwork.
- i. Wood paneling.
- j. Wood veneer wall covering.
- k. Wood flooring.
- l. Wood lockers.
- m. Wood cabinets.
- n. Non-rented temporary construction, including bracing, concrete formwork, pedestrian barriers, and temporary protection.
- o. Custom built-in wood furniture and furnishings

## 2.6 LOW-EMITTING MATERIALS

- A. Credit EQ 4.1: For interior applications (inside the exterior weatherproofing system), the VOC content of adhesives and sealants used must be less than the VOC limits of South Coast Air Quality Management District (SCAQMD) Rule #1168 requirements in effect on July 1, 2005, and rule amendment date of January 7, 2005.. Aerosol adhesives must meet the requirements of Green Seal Standard GS-36 in effect on October 19, 2000.

1. Architectural Applications ..... VOC Limit (g/L less water)
  - a. Indoor Carpet Adhesives:..... 50 g/L
  - b. Carpet Pad Adhesives: ..... 50 g/L
  - c. Wood Flooring Adhesive: ..... 100 g/L.
  - d. Rubber Floor Adhesives:..... 60 g/L.
  - e. Subfloor Adhesives: ..... 50 g/L.
  - f. Ceramic Tile Adhesives: ..... 65 g/L.
  - g. VCT and Asphalt Tile Adhesives: ..... 50 g/L.
  - h. Gypsum Board and Panel Adhesives: ..... 50 g/L.
  - i. Cove Base Adhesives: ..... 50 g/L.
  - j. Multipurpose Construction Adhesives:..... 70 g/L.
  - k. Structural Glazing Adhesives: ..... 100 g/L.
2. Substrate Specific Applications (Adhesives and Glues):
  - a. Metal to Metal:..... 30 g/L.
  - b. Plastic Foams:..... 50 g/L.
  - c. Porous Materials (Except Wood): ..... 50 g/L.
  - d. Wood: ..... 30 g/L.
  - e. Fiberglass:..... 80 g/L.
3. Specialty Applications:
  - a. PVC Welding: ..... 510 g/L.
  - b. CPVC Welding: ..... 490 g/L.
  - c. ABS Welding: ..... 325 g/L.
  - d. Plastic Cement Welding: ..... 250 g/L.
  - e. Adhesive Primer for Plastic: ..... 550 g/L.
  - f. Contact Adhesive: ..... 80 g/L.
  - g. Special Purpose Contact Adhesive:..... 250 g/L
  - h. Structural Wood Member Adhesive: ..... 140 g/L
  - i. Sheet Applied Rubber Lining Operations:..... 850 g/L
  - j. Top and Trim Adhesive: ..... 250 g/L
4. Sealants:
  - a. Architectural: ..... 250 g/L.
  - b. Nonmembrane Roof ..... 300 g/L
  - c. Roadway: ..... 250 g/L
  - d. Single Ply Roof Membrane: ..... 450 g/L

- e. Other: ..... 420 g/L
- f. Sealant Primers for Nonporous Substrates: ..... 250 g/L.
- g. Sealant Primers for Porous Substrates:..... 775 g/L.
- h. Other Sealant Primers:..... 750 g/L
- 5. Aerosol Adhesives (Green Seal) VOC Weight (g/L minus water)
  - a. General purpose mist spray: ..... 65% VOC's by weight
  - b. General purpose web spray: ..... 55% VOC's by weight
  - c. Special purpose aerosol adhesives (all types):... 70% VOC's by weight
- B. Credit EQ 4.2: For interior applications use paints and coatings that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA method 24) and the following chemical restrictions:
  - 1. Flat Paints and Coatings: VOC not more than 50 g/L.
  - 2. Non-Flat Paints and Coatings: VOC not more than 150 g/L.
  - 3. Anti-Corrosive Coatings: VOC not more than 250 g/L.
  - 4. Clear Wood Finishes: Varnishes - VOC not more than 350 g/L and Lacquers - VOC not more than 550 g/L.
  - 5. Floor Coatings: VOC not more than 100 g/L.
  - 6. Sealers, waterproofing sealers: VOC not more than 250 g/L; sanding sealers - VOC not more than 275 g/L; all other sealers - VOC not more than 200 g/L.
  - 7. Stains: VOC not more than 250 g/L.
  - 8. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight total aromatic compounds (hydrocarbon compounds containing one or more benzene rings).
  - 9. Restricted Components: Paints and coatings shall not contain any of the following:
    - a. Acrolein.
    - b. Acrylonitrile.
    - c. Antimony.
    - d. Benzene.
    - e. Butyl benzyl phthalate.
    - f. Cadmium.
    - g. Di (2-ethylhexyl) phthalate.
    - h. Di-n-butyl phthalate.
    - i. Di-n-octyl phthalate.
    - j. 1,2-dichlorobenzene.
    - k. Diethyl phthalate.
    - l. Dimethyl phthalate.
    - m. Ethylbenzene.
    - n. Formaldehyde.
    - o. Hexavalent chromium.
    - p. Isophorone.
    - q. Lead.
    - r. Mercury.
    - s. Methyl ethyl ketone.
    - t. Methyl isobutyl ketone.
    - u. Methylene chloride.
    - v. Naphthalene.
    - w. Toluene (methylbenzene).
    - x. 1,1,1-trichloroethane.
    - y. Vinyl chloride.
- C. Credit EQ 4.3
  - 1. Carpet systems must meet or exceed the requirements of the Carpet and Rug Institute's Green Label Plus Indoor Air Quality Test Program.
  - 2. Carpet cushion must meet or exceed the requirements of the Carpet and Rug Institute's Green Label Program.

3. Hard surface flooring must meet or exceed the requirements of the FloorScore standard.
  4. Adhesive: Meet EQc4.1.
- D. Credit EQ 4.4: Do not use composite wood and agrifiber products, including core materials that contain added urea-formaldehyde resin. . Adhesives used in field- and shop-fabricated assemblies containing these products must contain no urea-formaldehyde.

### PART 3 - EXECUTION

#### 3.1 CONSTRUCTION WASTE MANAGEMENT

- A. Credit MR 2: Comply with Division 01 Section 017419 "Construction Waste Management."

#### 3.2 CONSTRUCTION INDOOR AIR QUALITY MANAGEMENT

- A. Credit EQ 3.1: Comply with SMACNA IAQ Guideline for Occupied Buildings under Construction, 1995. Comply with requirements of Division 1 Section 012500 Product Requirements for delivery, storage and handling.
1. If Owner authorizes the use of permanent heating, cooling, and ventilating systems during construction period as specified in Division 1 Section "Temporary Facilities and Controls," install filter media having a MERV 8 according to ASHRAE 52.2 at each return-air inlet for the air-handling system used during construction.
- B. Credit EQ 3.2:
1. After construction ends and with all interior finishes installed, as described in the Reference Guide, install new filtration media and flush-out the building by supplying a total air volume of 14,000 cu. ft. of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 degrees F and, where mechanical cooling is operated, relative humidity no higher than 60%.
  2. The space may only be occupied following delivery of a minimum of 3,500 cu. ft. of outdoor air per sq. ft. of floor area to the space, and provided the space is ventilated at minimum rate of 0.30 cfm/ft<sup>2</sup> of outside air or the design minimum outside air rate, whichever is greater, a minimum of three hours prior to occupancy and during occupancy, until the total of 14,000 ft<sup>3</sup>/ft<sup>2</sup> of outside air has been delivered to the space.  

\*\*\*\*OR\*\*\*\*
  3. Conduct baseline IAQ testing, after construction ends and prior to occupancy, using testing protocols consistent with the United States Environmental Protection Agency "Compendium of Methods for the Determination of Air Pollutants in Indoor Air" and as additionally detailed in the Reference Guide.
  4. Demonstrate that the contaminants concentration levels listed below are not exceeded:

CONTAMINATE	MAXIMUM CONCENTRATION
Formaldehyde	50 parts per billion
Particulates (PM10)	50 micrograms per cubic meter
Total Volatile Organic Compounds (TVOC)	500 micrograms per cubic meter
* 4-Phenylcyclohexene (4-PCH)	6.5 micrograms per cubic meter
Carbon Monoxide (CO)	9 part per million and no greater than 2 parts per million above outdoor levels

- \* This test is required only if carpets and fabrics with Styrene Butadiene (SB) latex backing material are installed as part of the base building systems.

5. For each sampling point where the maximum concentration limits are exceeded conduct additional flushout with outside air and retest the specific parameter(s) that were exceeded to indicate the requirements are achieved. Repeat procedure until all requirements have been met. When retesting non-complying building areas, take samples from the same locations as in the first test.
6. The air sample testing shall be conducted as follows:
  - a. All measurements shall be conducted prior to occupancy, but during normal occupied hours, and with the building ventilation system starting at the normal daily start time and operated at the minimum outside air flow rate for the occupied mode throughout the duration of the air testing.
  - b. The building shall have all interior finishes installed, including but not limited to millwork, doors, paint, and acoustic tiles. Non-fixed furnishings such as workstations and partitions are encouraged, but not required, to be in place for the testing.
  - c. The number of sampling locations will vary depending upon the size of the building and number of ventilation systems. For each portion of the building served by a separate ventilation system, the number of sampling points shall not be less than one per 25,000 sq. ft., or for each contiguous floor area, whichever is larger, and include areas with the least ventilation and greatest presumed source strength.
  - d. Air samples are shall be collected between 4 feet and 7 feet from the floor to represent the breathing zone of occupants and over a minimum 4 hour period.

### **3.3 INDOOR CHEMICAL AND POLLUTANT SOURCE CONTROL**

- A. Replace all air filters immediately prior to occupancy. Replacement air filters shall have a MERV 13 according to ASHRAE 52.2.

### **EXHIBIT 1 - LEED CREDIT LIST: SEE ATTACHMENT AFTER END OF THIS SECTION**

**Exhibit 2 – Sample Construction Indoor Air Quality Management Plan**

The following plan is an outline only, and should be edited to reflect the unique requirements of each project. The plan is meant to address the requirements for two points available under LEED Version 2009, Indoor Environmental Quality Credit 3.1 and 3.2 – Construction IAQ Management Plan.

- A. SMACNA IAQ Requirements for Unoccupied Buildings:** During construction the Contractor shall meet or exceed the minimum requirements of the Sheet Metal and Air Conditioning National Design/Builders Association (SMACNA), IAQ Guidelines for Occupied Buildings Under Construction, 1995, Chapter 3, for the items listed below:
- 1. HVAC Protection:**
    - a. Protect all air handling and distribution equipment, and air supply and return ducting during construction.
    - b. Adequately cover and protect all exposed air inlets and outlets openings, grilles, ducts, plenums, etc. to prevent water, moisture, dust, and other contaminate intrusion.
    - c. Apply protection immediately after installation of equipment and ducting.
    - d. Ducting runs that require more than a single day to install shall be protected at the end of each day's Work.
    - e.
  - 2. Source Control:**
    - a. Protect stored on-site or installed absorptive or porous materials such as batt insulation and drywall from exposure to moisture.
    - b. Do not use wet damaged porous materials in the building.
    - c. Provide adequate ventilation of packaged dry products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously during the ventilation period. Do not ventilate within limits of Work unless otherwise approved by Architect.
    - d. Route material deliveries and construction waste removal around the exterior of the building, not through it.
  - 3. Pathway Interruption:**
    - a. The Owner does not plan to occupy the building until construction is complete.
  - 4. Housekeeping:**
    - a. Minimize accumulation of dust fumes, vapors, or gases in the building.
    - b. Suppress dust with wetting agents or sweeping compounds.
    - c. Clean-up dust using a wet rag or damp mop.
    - d. Increase the cleaning frequency when dust build-up is noted.
    - e. Remove spills or excess applications of solvent-containing products as soon as possible.
    - f. Remove accumulated water and keep work areas as dry as possible.
    - g. Vacuum using HEPA filtered vacuum cleaners.
    - h. Store volatile liquids, including fuels and solvents, in closed containers and outside of the building when not in use.
    - i. Keep volatile liquid containers closed when the container is inside of the building and not in use.

5. **Scheduling:**
- a. Schedule for application of interior finishes including timeframes for the application of wet materials onto dry materials, dry materials onto wet materials, and expected curing times for applied wet materials.
  - b. Wet materials include all paints, adhesives, sealants, coatings, finishes and spray-applied materials, such as structural fireproofing.
  - c. Insure that all wet applied interior finish materials are properly and fully cured before installing other finish materials over them.
  - d. Install furnishings after all other interior finish materials have been applied and fully cured.
  - e. Provide sufficient ventilation, air circulation and air changes to properly cure materials.
  - f. Provide sufficient ventilation, air circulation and air changes to dissipate excess humidity when present.
- B. Protection of stored on-site or installed absorptive materials from moisture damage.
- C. If air handlers must be used during construction, use of filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 at each return air grill, as determined by ASHRAE 52.2-1999.
- D. Replacement of all filtration media immediately prior to occupancy
- E. **Building Two-Week Flushout Procedure:** After substantial completion and prior to occupancy the Contractor shall conduct a building flushout: After construction ends and with all interior finishes installed, as described in the Reference Guide, install new filtration media and flush-out the building by supplying a total air volume of 14,000 cu. ft. of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 degrees F and, where mechanical cooling is operated, relative humidity no higher than 60%.
- 1. The space may only be occupied following delivery of a minimum of 3,500 cu. ft. of outdoor air per sq. ft. of floor area to the space, and provided the space is ventilated at minimum rate of 0.30 cfm/ft<sup>2</sup> of outside air or the design minimum outside air rate, whichever is greater, a minimum of three hours prior to occupancy and during occupancy, until the total of 14,000 ft<sup>3</sup>/ft<sup>2</sup> of outside air has been delivered to the space.

**Exhibit 3 – Materials Tracking List**

These are some recommended materials to track for recycled content, reused materials, and local manufacture/harvest, per LEED™ Materials and Resources Credits 3, 4 and 5. This chart is meant as a guidance document and not a complete list of materials.

POTENTIAL MATERIALS TO TRACK FOR LEED™	RECYCLED CONTENT	LOCAL MATERIALS
<u>Division 03—Concrete:</u>		
Concrete (all types)	x	x
Reinforcing steel	x	x
<u>Division 04—Masonry:</u>		
CMU	x	x
Reinforcing steel	x	x
<u>Division 05—Metals:</u>		
Structural steel	x	x
Steel studs/steel framing	x	x
Reinforcing steel	x	x
Aluminum components	x	x
Metal decking	x	x
(Do not include metal plumbing, mechanical or electrical components)		
<u>Division 06—Wood ,Plastics, and Composites</u>		
Casework	x	x
Millwork	x	x
MDF	x	x
Particleboard	x	x



<u>Division 07—Thermal and Moisture Protection</u>		
Waterproofing	x	x
Insulation	x	x
Sheet metalwork and metal flashings	x	x
Metal roofing	x	x
Fireproofing	x	x
<u>Division 8—Openings</u>		
Metal doors	x	
Aluminum assemblies	x	
<u>Division 9—Finishes</u>		
Metal support systems	x	
Ceiling suspension systems	x	x
Gypsum board	x	
Ceramic tile	x	
Acoustical ceiling	x	x
Wall base	x	
Acoustical insulation	x	x
<u>Division 10—Specialties</u>		
Toilet partitions	x	
Aluminum wall louvers	x	
<u>Division 32—Exterior Improvements:</u>		
Concrete (all types)	x	x
Aggregate	x	x
Asphalt	x	x
Crushed base	x	x
Landscape material		x
Formwork		

**Exhibit 4: Note: this table is for example purposes only and is not to be construed as complete or comprehensive.**

<b>MR Credit 4 / MR Credit 5</b>	<b>Project Name</b>
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**Materials Table**

Description of Material	Material Cost (Less Labor & Equipment) [\$]	MR Credit 4			MR Credit 5	
		Recycled Content			Local/Regional Materials	
		Post-Consumer [%]	Post-Industrial [%]	Value [\$]	Credit 5.1 Manufacture [\$]	Credit 5.2 Harvested [\$]
<b>32 Exterior Improvements</b>						
02200 Irrigation	\$2,000	0.0%	0.0%	\$0	\$2,000	\$0
02300 Sand	\$2,000	0.0%	0.0%	\$0	\$800	\$800
02300 Gravel	\$2,000	0.0%	0.0%	\$0	\$1,000	\$1,000
02795 Gravel Pave 2	\$2,000	0.0%	100.0%	\$1,000	\$0	\$0
02800 Firestone Liner	\$2,000	0.0%	0.0%	\$0	\$0	\$0
02900 Plants / Trees	\$2,000	0.0%	0.0%	\$0	\$12,000	\$12,000
<b>03 CONCRETE</b>						
03200 Rebar	\$30,000	71.6%	23.9%	\$25,069	\$8,528	\$0
03300 Cast-in-Place	\$30,000	0.0%	18.0%	\$2,700	\$35,311	\$0
03300 Cast-in-Place (Shoring)	\$3,000	0.0%	0.0%	\$0	\$0	\$0
03300 Slurry Concrete - Shoring	\$3,000	0.0%	90.0%	\$1,350	\$0	\$0
03300 Slurry Concrete - Cement	\$3,000	0.0%	2.0%	\$30	\$0	\$0
<b>04 MASONRY</b>						
04050 Concrete Masonry Units	\$40,000	0.0%	0.0%	\$0	\$12,238	\$12,238
<b>05 METALS</b>						
05100 Structural Steel	\$50,000	90.0%	0.0%	\$45,000	\$74,860	\$0
05500 Miscellaneous metals	\$5,000	55.0%	35.0%	\$3,625	\$13,210	\$0
05500 Skylight Metal Frame and Clips	\$5,000	20.0%	0.0%	\$1,000	\$5,660	\$0
05700 Shoring Steel	\$5,000	55.0%	35.0%	\$3,625	\$4,495	\$0
<b>06 WOODS, PLASTICS, &amp; Composites</b>						
06050 Lumber (framing)	\$60,000	0.0%	0.0%	\$0	\$0	\$0
06100 Hardiboard Siding	\$60,000	0.0%	0.0%	\$0	\$70,000	\$0
06430 Wood Stairs	\$6,000	0.0%	0.0%	\$0	\$14,732	\$0
06400 Medite II particleboard	\$6,000	0.0%	80.0%	\$2,400	\$0	\$0
<b>07 THERMAL / MOISTURE PROTECTION</b>						
07000 Insulation	\$7,000	25.0%	0.0%	\$1,750	\$3,629	\$0
07100 Waterproofing	\$7,000	0.0%	0.0%	\$0	\$0	\$0
07500 Roofing Materials	\$70,000	10.0%	0.0%	\$7,000	\$0	\$0
07500 Rooftop Pavers	\$7,000	0.0%	0.0%	\$0	\$23,500	\$23,500
07600 Metal Roofing	\$7,000	25.0%	0.0%	\$1,750	\$7,240	\$0
07600 Sheet Metal Flashing	\$7,000	30.0%	0.0%	\$2,100	\$27,718	\$0
07600 Water Resistive Board	\$7,000	31.0%	0.0%	\$2,170	\$0	\$0
<b>08 OPENINGS</b>						
08200 Wood Windows and Glass	\$80,000	0.0%	0.0%	\$0	\$0	\$0
08210 Marshfield Composite Doors	\$8,000	40.0%	0.0%	\$3,200	\$0	\$0
08700 Skylight Glass	\$8,000	0.0%	0.0%	\$0	\$4,662	\$0
08800 Steel Windows and Glazing	\$80,000	0.0%	0.0%	\$0	\$40,400	\$0
08800 Hollow Metal Frames	\$8,000	55.0%	35.0%	\$5,800	\$4,800	\$0
08800 Finish Hardware	\$8,000	0.0%	0.0%	\$0	\$0	\$0
<b>09 FINISHES</b>						
09200 Gypsum Wallboard	\$9,000	5.0%	31.0%	\$1,845	\$0	\$0
09300 Ceramic Tile	\$9,000	55.0%	0.0%	\$4,950	\$8,600	\$8,600
09500 Acoustical Ceiling Tile	\$9,000	35.0%	0.0%	\$3,150	\$0	\$0
09600 Linoleum Flooring	\$9,000	0.0%	0.0%	\$0	\$0	\$0
09652 Rubber Base	\$9,000	0.0%	90.0%	\$4,050	\$1,590	\$0
09900 Paint	\$9,000	0.0%	0.0%	\$0	\$9,000	\$0
<b>10 SPECIALTIES</b>						
10150 Toilet Partitions	\$10,000	100.0%	0.0%	\$10,000	\$0	\$0
10800 Toilet Accessories	\$1,000	35.0%	35.0%	\$525	\$5,059	\$0
<b>TOTAL</b>	<b>\$687,000</b>			<b>\$134,089</b>	<b>\$391,032</b>	<b>\$58,138</b>

<b>Percentage of Recycled Content (MR Credit 4)</b>	<b>20%</b>
<b>Local/Regional Materials Percentage (MR Credit 5)</b>	<b>57%</b>
<b>Local/Regional Materials Percentage (MR Credit 5)</b>	<b>8%</b>

**REQUIREMENTS PER LEED SECTION 018113**

Company: \_\_\_\_\_

Date: \_\_\_\_\_

Representative: \_\_\_\_\_

Vendor/Supplier: \_\_\_\_\_

Representative: \_\_\_\_\_

Per requirements in LEED Specification section 018113 you are required to submit the listed information for all materials and products to be provided for the (Project) \_\_\_\_\_.

Please fill out and return this form for each individual product or material type. Do not leave any blanks; enter "0" or N/A if that is the case. Please call our jobsite office with any questions \_\_\_\_\_.

Specification Section: \_\_\_\_\_

Product/Material

Description: \_\_\_\_\_

Total Product /  
Material Cost \$ \_\_\_\_\_  
(Excluding Labor &  
Equipment)

Note: Definitions for the following items can be found in Specification Section 018113-1.2.

Percentage of Pre-  
Consumer  
Recycled Content \_\_\_\_\_%

Percentage of Post-  
Consumer Recycled  
Content \_\_\_\_\_%

Point of extraction, harvested or recovery AND manufactured if within 500 mile  
Radius of Project Jobsite \_\_\_\_\_  
\_\_\_\_\_

If only a fraction of the material was extracted, harvested or recovered AND manufactured within 500 miles of the project site provide that percentage by weight: \_\_\_\_\_

Signed \_\_\_\_\_ Date \_\_\_\_\_

Note: This form is not required for mechanical, electrical, plumbing or other specialty items such as elevators and equipment. Furniture may be included only if it is included consistently in MR Credits 3-7 also.

**END OF SECTION**





## LEED 2009 for New Construction and Major Renovation Project Scorecard

**Project Name:** Kensington Fire Station #25  
**Project Address:** 3227 Bel Pre Rd Aspen Hill, MD 20906-2695

Yes	?	No
15	5	6
<b>SUSTAINABLE SITES</b>		
<b>26 Points</b>		

<b>Y</b>		Prereq 1	<b>Construction Activity Pollution Prevention</b>	<b>Required</b>
1		Credit 1	<b>Site Selection</b>	1
		Credit 2	<b>Development Density and Community Connectivity</b>	5
		Credit 3	<b>Brownfield Redevelopment</b>	1
6		Credit 4.1	<b>Alternative Transportation - Public Transportation Access</b>	6
1		Credit 4.2	<b>Alternative Transportation - Bicycle Storage and Changing Rooms</b>	1
3		Credit 4.3	<b>Alternative Transportation - Low-Emitting and Fuel-Efficient Vehicles</b>	3
	2	Credit 4.4	<b>Alternative Transportation - Parking Capacity</b>	2
	1	Credit 5.1	<b>Site Development - Protect or Restore Habitat</b>	1
	1	Credit 5.2	<b>Site Development - Maximize Open Space</b>	1
1		Credit 6.1	<b>Stormwater Design - Quantity Control</b>	1
1		Credit 6.2	<b>Stormwater Design - Quality Control</b>	1
	1	Credit 7.1	<b>Heat Island Effect - Nonroof</b>	1
1		Credit 7.2	<b>Heat Island Effect - Roof</b>	1
1		Credit 8	<b>Light Pollution Reduction</b>	1

Yes	?	No
6		2
<b>WATER EFFICIENCY</b>		
<b>10 Points</b>		

<b>Y</b>		Prereq 1	<b>Water Use Reduction</b>	<b>Required</b>
4		Credit 1	<b>Water Efficient Landscaping</b>	2 to 4
			Reduce by 50%	2
			No Potable Water Use or Irrigation	4
		Credit 2	<b>Innovative Wastewater Technologies</b>	2
2		Credit 3	<b>Water Use Reduction</b>	2 to 4
			Reduce by 30%	2
			Reduce by 35%	3
			Reduce by 40%	4

12	5	18
<b>ENERGY &amp; ATMOSPHERE</b>		
<b>35 Points</b>		

Y		Prereq 1	Fundamental Commissioning of Building Energy Systems	Required	
Y		Prereq 2	Minimum Energy Performance	Required	
Y		Prereq 3	Fundamental Refrigerant Management	Required	
6	1	12	Credit 1	Optimize Energy Performance	1 to 19
			Improve by 12% for New Buildings or 8% for Existing Building Renovations	1	
			Improve by 14% for New Buildings or 10% for Existing Building Renovations	2	
			Improve by 16% for New Buildings or 12% for Existing Building Renovations	3	
			Improve by 18% for New Buildings or 14% for Existing Building Renovations	4	
			Improve by 20% for New Buildings or 16% for Existing Building Renovations	5	
			6 Improve by 22% for New Buildings or 18% for Existing Building Renovations	6	
			Improve by 24% for New Buildings or 20% for Existing Building Renovations	7	
			Improve by 26% for New Buildings or 22% for Existing Building Renovations	8	
			Improve by 28% for New Buildings or 24% for Existing Building Renovations	9	
			Improve by 30% for New Buildings or 26% for Existing Building Renovations	10	
			Improve by 32% for New Buildings or 28% for Existing Building Renovations	11	
			Improve by 34% for New Buildings or 30% for Existing Building Renovations	12	
			Improve by 36% for New Buildings or 32% for Existing Building Renovations	13	
			Improve by 38% for New Buildings or 34% for Existing Building Renovations	14	
			Improve by 40% for New Buildings or 36% for Existing Building Renovations	15	
			Improve by 42% for New Buildings or 38% for Existing Building Renovations	16	
			Improve by 44% for New Buildings or 40% for Existing Building Renovations	17	
			Improve by 46% for New Buildings or 42% for Existing Building Renovations	18	
			Improve by 48%+ for New Buildings or 44%+ for Existing Building Renovations	19	
	1	6	Credit 2	On-Site Renewable Energy	1 to 7
			1% Renewable Energy	1	
			3% Renewable Energy	2	
			5% Renewable Energy	3	
			7% Renewable Energy	4	
			9% Renewable Energy	5	
			11% Renewable Energy	6	
			13% Renewable Energy	7	
2			Credit 3	Enhanced Commissioning	2
2			Credit 4	Enhanced Refrigerant Management	2
	3		Credit 5	Measurement and Verification	3
2			Credit 6	Green Power	2



## LEED 2009 for New Construction and Major Renovation Project Scorecard

**Project Name:** Kensington Fire Station #25  
**Project Address:** 3227 Bel Pre Rd Aspen Hill, MD 20906-2695

Yes ? No

Yes ? No

7	2	5	<b>MATERIALS &amp; RESOURCES</b>	14 Points
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<b>Y</b>		Prereq 1	<b>Storage and Collection of Recyclables</b>	<b>Required</b>
<b>1</b>	<b>1</b>	Credit 1.1	<b>Building Reuse - Maintain Existing Walls, Floors and Roof</b>	<b>1 to 3</b>
			<input type="checkbox"/> Reuse 55%	1
			<input type="checkbox"/> Reuse 75%	2
			<input type="checkbox"/> Reuse 95%	3
		Credit 1.2	<b>Building Reuse - Maintain Interior Nonstructural Elements</b>	<b>1</b>
<b>2</b>		Credit 2	<b>Construction Waste Management</b>	<b>1 to 2</b>
			<input type="checkbox"/> 50% Recycled or Salvaged	1
			<input type="checkbox"/> 75% Recycled or Salvaged	2
		Credit 3	<b>Materials Reuse</b>	<b>1 to 2</b>
			<input type="checkbox"/> Reuse 5%	1
			<input type="checkbox"/> Reuse 10%	2
<b>2</b>		Credit 4	<b>Recycled Content</b>	<b>1 to 2</b>
			<input type="checkbox"/> 10% of Content	1
			<input type="checkbox"/> 20% of Content	2
<b>2</b>		Credit 5	<b>Regional Materials</b>	<b>1 to 2</b>
			<input type="checkbox"/> 10% of Materials	1
			<input type="checkbox"/> 20% of Materials	2
		Credit 6	<b>Rapidly Renewable Materials</b>	<b>1</b>
	<b>1</b>	Credit 7	<b>Certified Wood</b>	<b>1</b>

Yes ? No

12	1	2	<b>INDOOR ENVIRONMENTAL QUALITY</b>	15 Points
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<b>Y</b>		Prereq 1	<b>Minimum Indoor Air Quality Performance</b>	<b>Required</b>
<b>Y</b>		Prereq 2	<b>Environmental Tobacco Smoke (ETS) Control</b>	<b>Required</b>
<b>1</b>		Credit 1	<b>Outdoor Air Delivery Monitoring</b>	<b>1</b>
		Credit 2	<b>Increased Ventilation</b>	<b>1</b>
<b>1</b>		Credit 3.1	<b>Construction Indoor Air Quality Management Plan - During Construction</b>	<b>1</b>
<b>1</b>		Credit 3.2	<b>Construction Indoor Air Quality Management Plan - Before Occupancy</b>	<b>1</b>
<b>1</b>		Credit 4.1	<b>Low-Emitting Materials - Adhesives and Sealants</b>	<b>1</b>
<b>1</b>		Credit 4.2	<b>Low-Emitting Materials - Paints and Coatings</b>	<b>1</b>
<b>1</b>		Credit 4.3	<b>Low-Emitting Materials - Flooring Systems</b>	<b>1</b>
<b>1</b>		Credit 4.4	<b>Low-Emitting Materials - Composite Wood and Agrifiber Products</b>	<b>1</b>
	<b>1</b>	Credit 5	<b>Indoor Chemical and Pollutant Source Control</b>	<b>1</b>
<b>1</b>		Credit 6.1	<b>Controllability of Systems - Lighting</b>	<b>1</b>
<b>1</b>		Credit 6.2	<b>Controllability of Systems - Thermal Comfort</b>	<b>1</b>
<b>1</b>		Credit 7.1	<b>Thermal Comfort - Design</b>	<b>1</b>
<b>1</b>		Credit 7.2	<b>Thermal Comfort - Verification</b>	<b>1</b>
<b>1</b>		Credit 8.1	<b>Daylight and Views - Daylight</b>	<b>1</b>
<b>1</b>		Credit 8.2	<b>Daylight and Views - Views</b>	<b>1</b>

Yes ? No

2	4		<b>INNOVATION IN DESIGN</b>	6 Points
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<b>1</b>	<b>4</b>	Credit 1	<b>Innovation in Design</b>	<b>1 to 5</b>
			<input type="checkbox"/> Innovation or Exemplary Performance	1
			<input type="checkbox"/> Innovation or Exemplary Performance	1
			<input type="checkbox"/> Innovation or Exemplary Performance	1
			<b>1</b> Innovation: Envelope Consultant	1
			<input type="checkbox"/> Innovation:	1
<b>1</b>		Credit 2	<b>LEED® Accredited Professional</b>	<b>1</b>

Yes ? No

3		1	<b>REGIONAL PRIORITY</b>	4 Points
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<b>3</b>		Credit 1	<b>Regional Priority</b>	<b>1 to 4</b>
			<input type="checkbox"/> SSc6.1	1
			<input type="checkbox"/> MRc2 (50%)	1
			<input type="checkbox"/> MRc1 (55%)	1
			<input type="checkbox"/> WEc3 (40%), WEc2, or EAc2 (1%)	1

Yes ? No

57	17	34	<b>PROJECT TOTALS (Certification Estimates)</b>	110 Points
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Certified: 40-49 points Silver: 50-59 points Gold: 60-79 points Platinum: 80+ points

**SECTION 018119****CONSTRUCTION INDOOR AIR QUALITY (IAQ) MANAGEMENT****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes:
  - 1. Special requirements for Indoor Air Quality (IAQ) management during construction operations.
  - 2. Procedures for testing baseline IAQ. Baseline IAQ requirements specify maximum indoor pollutant concentrations for acceptance of the facility.
  - 3. Requirements for Independent Materials Testing of specific materials anticipated to have measurable impact on IAQ.
- B. Related Sections:
  - 1. Section 013100 – Project Management and Coordination: Meetings and project coordination.
  - 2. Section 017400 – Cleaning.
  - 3. Section 017700 – Closeout Procedures: Final Submittals.
  - 4. Section 018113 – Sustainable Design Requirements.
  - 5. Section 019100 – Commissioning

**1.2 DEFINITIONS**

- A. Definitions pertaining to sustainable development: As defined in ASTM E2114.
- B. Adequate ventilation: Ventilation, including air circulation and air changes, required to cure materials, dissipate humidity, and prevent accumulation of dust fumes, vapors, or gasses.
- C. Environmental pollution and damage: The presence of chemical, physical, or biological elements or agents which adversely affect human health or welfare; unfavorably alter ecological balances; or degrade the utility of the environment for aesthetic, cultural, or historical purpose.
- D. Hazardous Materials: Any material that regulated as a hazardous material in accordance with 49 CFR 173, requires a Material Safety Data Sheet (MSDS) in accordance with 29 CFR 1910.1200, or which during end use, treatment, handling, storage, transportation or disposal meets or has components which meet or have the potential to meet the definition of hazardous Waste in accordance with 40 CFR 261. Throughout this specification, hazardous material includes hazardous chemicals.
  - 1. Hazardous materials include: pesticides, biocides, and carcinogens as listed by recognized authorities, such as the Environmental Protection Agency (EPA) and the International Agency for Research on Cancer (IARC).
  - 2. Do NOT submit MSDS sheets to Architect as construction submittals.
- E. Indoor Air Quality (IAQ): The composition and characteristics of the air in an enclosed space that affect the occupants of that space. The indoor air quality of the space refers to the relative quality of air in a building with respect to contaminants and hazards and is determined by the level of indoor air pollution and other characteristics of the air, including those that impact thermal comfort such as air temperature, relative humidity and air speed.
- F. Interior final finishes: materials and products will be exposed at interior, occupied spaces: including flooring, wallcovering, finish carpentry, and ceilings.
- G. Packaged dry products: materials and products that are installed in dry form and are delivered to the site in manufacturer's packaging; including carpets, resilient flooring, ceiling tiles, and insulation.
- H. Wet products: Materials and products installed in wet form, including paints, sealants, adhesives, and special coatings.

**1.3 QUALITY ASSURANCE**

- A. Inspection and Testing Lab Qualifications: Minimum of 5 years experience in performing the types of testing specified herein.

**1.4 PRECONSTRUCTION MEETING**

- A. After award of Contract and prior to the commencement of the Work, schedule and conduct meeting with Owner and Architect to discuss the proposed IAQ Management Plan and to develop mutual understanding relative to details of environmental protection.

**1.5 SUBMITTALS**

- A. Indoor Air Quality (IAQ) Management Plan: Not less than 10 days before the Preconstruction meeting, prepare and submit an IAQ Management Plan including, but not limited to, the following:
  - 1. Schedule for application of interior finishes.
  - 2. Revise and resubmit Plan as required by Owner.
    - a. Approval of Contractor's Plan will not relieve the Contractor of responsibility for compliance with applicable environmental regulations.
- B. Baseline Indoor Air Quality (IAQ) Test Reports.
- C. Independent Materials Testing Reports. Submit for the following products:
  - 1. Emissions:
    - a. Fireproofing ;material on appropriate substrate.
    - b. Ceiling tile.
    - c. Resilient flooring.
    - d. Carpet including adhesive and concrete flooring.
    - e. Interior paint on appropriate substrate, including any primer coat.
    - f. Wall covering.
  - 2. Lethal Toxic Potency.
    - a. Ceiling tile.
    - b. Resilient flooring.
    - c. Carpet including adhesive and concrete flooring
    - d. Wall covering.
    - e. Office equipment.
  - 3. Microbial Growth:
    - a. Fireproofing material on appropriate substrate.
    - b. Ceiling tile.
    - c. Wall covering.
- D. Product Data: Submit product data for filtration media used during construction and during operation. Include Minimum Efficiency Reporting Value (MERV).
- E. Material Safety Data Sheets: Submit MSDS when required as support for a material meeting a particular LEED requirement. However, submit the MSDS data as a LEED submittal and not as a construction submittal. Provide MSDS for the following products.
  - 1. Adhesives.
  - 2. Floor and wall patching/leveling materials.
  - 3. Caulking and sealants.
  - 4. Insulating materials.
  - 5. Fireproofing and firestopping.
  - 6. Carpet.
  - 7. Paint.
  - 8. Clear finish for wood surfaces.
  - 9. Lubricants.
  - 10. Cleaning products.

**PART 2 - PRODUCTS****NOT USED****PART 3 - EXECUTION****3.1 INDOOR AIR QUALITY (IAQ) MANAGEMENT**

- A. During construction, comply with SMACNA IAQ Guidelines for Occupied Buildings under construction.



- B. HVAC Protection: To the greatest extent possible, isolate and/or shut down the return side of the HVAC system during construction. When ventilation system must be operational during construction activities, provide temporary filters.
- C. Source Control: Provide low and zero VOC materials as specified.
- D. Pathway Interruption: Isolate areas of work as necessary to prevent contamination of clean or occupied spaces. Provide pressure differentials and/or physical barriers to protect clean or occupied spaces.
- E. Housekeeping: During construction, maintain project and building during the products systems to prevent contamination of building spaces.
  - 1. Protect stored on-site and installed absorptive materials from moisture damage.
  - 2. Provide minimum 48 hour pre-ventilation of packaged dry products prior to installation. Remove from packaging and ventilate in a secure, dry, well-ventilated space free from strong contaminant sources and residues. Provide a temperature range of 60 degrees F minimum to 90 degree F maximum continuously during the ventilation period. Do not ventilate within limits of Work unless otherwise approved by Architect.
  - 3. Provide adequate ventilation during and after installation of interior wet products and interior final finishes.
  - 4. Provide filtration media with a Minimum Efficiency Reporting Value (MERV) of 8 during construction and MERV 13 prior to occupancy (flushout) and during Owner occupancy as determined by ASHRAE 52.2 . Coordinate with work of Division 23.
- F. Scheduling: Schedule construction operations involving wet products prior to packaged dry products to the greatest extent possible.
- G. Flush-Out: Provide minimum 2-week flush-out of the building immediately prior to occupancy. Flush-out with 100 percent outside air. Replace all media filters after flush-out.
  - 1. Supply airflow at 6 air changes per hour when outside temperatures are between 55 degrees F and 85 degrees F and humidity is between 30 percent and 60 percent. Supply a minimum of 1.5 air changes per hour when conditions are not within this range.

### **3.2 INDOOR AIR QUALITY (IAQ) BASELINE**

- A. Coordinate with commissioning as specified in Section 019000. Upon verification of HVAC system operation, perform baseline IAQ testing.
  - 1. Perform testing for minimum 3 locations in each air handling zone. Perform in the breathing zone; between 4 feet and 7 feet from the floor.
  - 2. Collect air samples on three consecutive days during normal business hours (between the hours of 8:00 am and 5:00 pm) with building operating at normal HVAC rates. Average the result of each three-day test cycle to determine compliance or non- compliance of indoor air quality for each air handling zone tested.
  - 3. Sample and record outside air levels of formaldehyde and TVOC contaminants air outside air intake of each respective air handling unit simultaneously with indoor tests to establish basis of comparison for these contaminant levels.
- B. Baseline IAQ shall conform to the following standards and limits:
  - 1. Carbon Monoxide: Not to exceed 9 ppm.
  - 2. Carbon Dioxide: Set points not to exceed 530 ppm higher than outdoor ambient levels. Assess indoor Carbon Dioxide concentrations in accordance with ASTM D6245.
  - 3. Airborne Mold and Mildew: Simultaneous indoor and outdoor reading.
  - 4. VOCs and particulates: Monitor VOCs (volatile organic compounds) in indoor air rates, and qualities of the listed contaminants shall not exceed the following limits. The levels do not account for contributions from office furniture, occupants, and occupant activities.

**MAXIMUM INDOOR AIR CONCENTRATION STANDARDS****Indoor Contaminants****Allowable Air Concentration Levels**

Formaldehyde .....	<20 micrograms per cubic meter above outside air concentrations
Total Volatile Organic..... Compounds (TVOC)	<200 micrograms per cubic meter above outside air concentrations
4-Phenylcyclohexene (4-PC) .....	<3 micrograms per cubic meter
Total Particulates (PM) .....	<20 micrograms per cubic meter
Regulated Pollutants .....	<NAAQS

- C. Test Reports: Prepare test reports showing the results and location of each test, a summary of the HVAC operating conditions, a listing of any discrepancies and recommendations for corrective actions, if required.
1. Include certification of test equipment calibration with each test report.
  2. If an test fails the standard, the Contractor is responsible to ventilate the building with 100 percent outside air until the building passes both air quality test and duct inspections. Retesting shall be performed at no additional expense to the Owner

**3.3 INDEPENDENT MATERIALS TESTING**

- A. Emissions: Indicate type and rate of emissions in a 24 hour period at 35 degrees Centigrade and 50 percent relative humidity per unit of product. Indicate type and rate of emissions under fire condition.
1. Small Scale Chamber: Test and report emissions from products and materials indicated in accordance with ASTM D5116.
  2. Full Scale Chamber: Test and report emissions from products and materials indicated in accordance with ASTM D6670.
- B. Lethal Toxic Potency: Test for lethal toxic potency of smoke produced from the materials and products indicated under fire conditions in accordance with ASTM E1678.
1. Report results in accordance with Section 13 of ASTM E1678.
- C. Support of Microbial Growth; Test and report in accordance with ASTM D6329. Indicate susceptibility of product or material to colonization and amplification of microorganisms. Identify microorganisms and conditions of testing.
1. Normal conditions: Perform testing at 35 degrees Centigrade and 50 percent relative humidity.
  2. Extreme conditions: Perform worst case scenarios screening tests by providing an atmosphere where environmental conditions may be favorable for microbial growth.

**END OF SECTION**

**SECTION 024119**  
**SELECTIVE DEMOLITION**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Removal of designated building equipment, materials and fixtures.
  - 2. Removal of existing construction to accommodate new construction.
  - 3. Disconnecting and capping of identified utilities.
  - 4. Installation of temporary partitions to allow continued building occupancy by Owner.
- B. Related Sections:
  - 1. Section 013100 - Project Management and Coordination.
  - 2. Section 014500 – Contractor Quality Control.
  - 3. Section 015000 - Temporary Facilities and Controls: Temporary partitions and barriers.
  - 4. Section 017329 - Cutting and Patching.
  - 5. Section 017419 – Construction Waste Management and Disposal.
- C. This Project is a registered US Green Building Council “LEED” project.
  - 1. Reuse as much demolished materials as possible.
  - 2. Direct recyclable materials to recyclers and divert as much demolished materials from waste stream and landfill as possible.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Schedules:
  - 1. Submit schedule showing time and detailed sequence of demolition, removal of materials, arranged coordination for shut-off, capping, and continuation of utility services.
  - 2. Schedule demolition and removal work to ensure uninterrupted progress of Owner's on-site operations.
- C. Submit following Informational Submittals:
  - 1. Certifications specified in Quality Assurance article.
  - 2. Qualification Data: Submit demolition contractor's qualifications.
  - 3. LEED waste management reports.
- D. Closeout Submittals:
  - 1. Project Record Documents:
    - a. Submit under provisions of Section 017700.
    - b. Record actual locations of capped utilities.

**1.3 QUALITY ASSURANCE**

- A. Contractor Qualifications: Company specializing in demolition work with minimum of 3 years documented experience.
- B. Regulatory Requirements:
  - 1. Comply with applicable codes, ordinances, rules, regulations, and laws of local, municipal, state and federal authorities having jurisdiction.
  - 2. Obtain and pay for necessary permits and notices; post where required.
  - 3. Comply with safety requirements of local fire department.
- C. Notify affected utility companies before starting work and comply with their requirements.
- D. Do not close or obstruct egress width of fire exits or access.
- E. Do not disable or disrupt building fire or life safety systems without 72 hours prior written notice to Owner.

## F. LEED Requirements:

1. Credit MR 2: Divert 75 percent of construction material waste and site clearing debris from disposal in landfill or incinerators. Redirect recyclable recovered resources back to the manufacturing process. Redirect reusable materials to appropriate sites.
2. Refer to Section 017419 Construction Waste Management for additional requirements.

**1.4 PRE-DEMOLITION CONFERENCE**

## A. Conduct conference in accordance with Section 013100 to discuss following:

1. Present draft of demolition schedule for review.
2. Coordinate phasing requirements.
3. Identify items to be protected and preserved before proceeding with work. Existing CMU walls to remain shall be protected from elements during construction.
4. Conduct walking inspection to identify materials and equipment to be salvaged for Owner use.
5. During walking inspection, photograph or otherwise determine and record existing physical conditions of boundary areas. Surfaces, equipment, or other items damaged during demolition work are to be restored to original condition as recorded during walking inspection.
6. Agree upon location where items salvaged for Owner are to be delivered and stored.
7. Obtain agreement from Owner on day-to-day scheduling requirements and restrictions to avoid disruption of Owner operations resulting from demolition work, dirt, or noise.
8. Discuss environmental requirements and procedures.
  - a. Solid Waste Management Plan.
  - b. IAQ Management Plan.
  - c. Procedures for noise and acoustics management.
  - d. Environmental Management Plan.
  - e. Environmental Regulatory Requirements.

**1.5 PROJECT CONDITIONS**

## A. Occupancy:

1. Owner will vacate demolition area prior to start of demolition work.
2. Owner will continuously occupy areas of building immediately adjacent to selective demolition areas.
3. Conduct selective demolition work in manner that will minimize need for disruption of Owner's normal operations.
4. Provide minimum of 72 hours advanced notice to Owner of demolition activities which will severely impact Owner's normal operations.
5. Maintain free and safe passage to and from Owner occupied areas.

## B. Existing Conditions:

1. Owner assumes no responsibility for actual condition of areas to be demolished.

## C. Hazardous Materials:

1. Inform Architect and Owner immediately upon discovery of asbestos products, radioactive materials, radon gas, toxic wastes, or other similar hazardous materials.
2. Strictly follow procedures and regulations applicable to hazardous materials.
3. Do not remove hazardous materials without Owner authorization.
4. Give special consideration to handling of material that may contain asbestos. Neither asbestos detection nor removal is part of this Contract, and direction relating to that type of work will be given by the Owner.
5. Architect will have no responsibility for detection, evaluation, or removal of asbestos materials, or for construction contract administration of removal process.

## D. Explosives: Not permitted.

## E. Traffic and Passageways:

1. Maintain accessibility for fire fighting apparatus.
2. Conduct demolition operations and debris removal to avoid interference with use of roads, streets, walks, and adjacent occupied facilities.

3. Obtain written permission from authorities having jurisdiction prior to closing or obstructing streets, walks, or other adjacent occupied facilities.
4. Provide alternate routes when closing or obstructing traffic ways when required by governing authorities.
5. Ensure safe passage of persons around area of demolition. Provide and maintain temporary covered passageways; comply with requirements of governing authorities.

F. Protection:

1. Perform Work in manner to eliminate hazards to persons or property and avoid interference with adjacent areas, utilities and structures.
2. Provide and maintain temporary barricades, fences, warning signs, guardrails, warning lights, weatherproof and dust partitions, and other similar provisions as necessary or required by applicable regulatory authorities for protection of building occupants and workers.
3. Provide and maintain fire extinguishers; comply with requirements of governing authorities.
4. Maintain existing utilities which are to remain in service and protect from damage during demolition operations.
5. Do not interrupt existing utilities serving occupied facilities, except when authorized by Owner in writing. Provide temporary services during interruptions to existing utilities.
6. Coordinate in advance with Owner mechanical, electrical, and plumbing shutdowns.
7. Protect existing work indicated to remain from damage.
8. Protect existing CMU walls to remain from elements during construction.
9. Protect existing floors with suitable coverings when necessary.
10. Construct temporary dustproof partitions and seal return air plenums where necessary to areas where noisy or dirt and dust operations are being performed.
11. Provide temporary weather protection for areas where existing exterior elements were removed to ensure no water leakage or damage occurs to structure or interior areas of existing building.

## 1.6 SEQUENCING

- A. Phasing will be required; sequence activities to demolish the Work in Phases outlined on the Drawings.

## 1.7 SCHEDULING

- A. Schedule work to conform to the approved construction progress schedule specified in Section 013300.
- B. Schedule work to coincide with new construction.
- C. Describe demolition removal procedures and schedule.

## PART 2 - PRODUCTS

### NOT USED

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify demolition areas are unoccupied.

### 3.2 PREPARATION

- A. Provide, erect, and maintain temporary barriers and security devices.
- B. Protect existing structures and landscaping materials which are not being demolished.
- C. Prevent movement or settlement of adjacent structures. Provide bracing and shoring as necessary and be responsible for safety and support of structure. Assume liability for such movement, settlement, damage, or injury.

- D. Cover and protect furniture, equipment, and fixtures scheduled to remain from soiling or damage when demolition work is performed in rooms or areas from which such items have not been removed.
- E. Utilities:
  - 1. Mark and identify location of utilities to be disconnected.
  - 2. Notify affected utility company in advance of date and time when service needs to be disconnected.
  - 3. Disconnect and cap utility services; comply with requirements of governing authorities.
  - 4. Do not commence demolition operations until associated disconnections have been completed.

### **3.3 SALVAGEABLE MATERIAL AND EQUIPMENT**

- A. Carefully remove, store and protect following salvage materials and equipment for Owner's use. Deliver to location directed by Owner.
- B. Carefully remove, store, and protect items noted on Drawings for salvage.
- C. Materials Retained by Contractor:
  - 1. Items of salvageable value not indicated as Owner salvaged or scheduled for reinstallation may be removed as work progresses.
  - 2. Salvaged items must be removed from site as they are removed. Storage or sale of salvaged items on site will not be permitted.

### **3.4 DEMOLITION**

- A. General:
  - 1. Conduct demolition to minimize interference with adjacent occupied building areas.
  - 2. Cease demolition operations immediately if adjacent structures appear to be in danger. Conduct safety operations as necessary. Do not resume demolition operations until directed.
  - 3. Conduct operations with minimum interference to public or private accesses. Maintain egress and access at all times.
  - 4. Sprinkle debris with water to minimize dust. Provide hoses and water connections as necessary.
  - 5. Do not cause flooding or contaminated runoff.
- B. Demolish existing construction as indicated in orderly and careful manner to accommodate new work. Protect supporting structural members. Remove demolished materials from site daily and legally dispose of such materials.
- C. Perform demolition in accordance with governing authorities.
- D. Remove and immediately dispose of contaminated or vermin infested materials when encountered.
- E. Report to Architect and Owner unanticipated mechanical, electrical, or structural elements which conflict with intended function or design when encountered. Submit report in writing. Rearrange demolition schedule as necessary to continue overall project progress without delay.
- F. Do not burn or bury materials or debris on site. Leave structures and site in clean condition.

### **3.5 ADJUSTING**

- A. Repair demolition performed in excess of that required.
- B. Return structures and surfaces to remain to conditions existing prior to commencement of selective demolition Work.

### **3.6 CLEANING**

- A. General: Refer to Section 017700.
- B. Broom clean demolition areas of dust, dirt, and debris caused by demolition operations. Return adjacent areas to condition existing prior to start of work.

- C. Remove temporary work and protection when no longer needed.

**END OF SECTION**





**SECTION 03 3000**  
**CAST-IN-PLACE CONCRETE**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
  - 1. Footings.
  - 2. Slabs-on-grade.
  - 3. Concrete toppings.
- B. Related Sections include the following:
  - 1. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.
  - 2. Division 32 Section "Concrete Paving" for concrete pavement and walks.

**1.3 DEFINITIONS**

- A. 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.

**1.4 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup

spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.

- D. Welding certificates.
- E. Qualification Data: For Installer and manufacturer.
- F. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
  - 1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.
- G. Material Certificates: For each of the following, signed by manufacturers:
  - 1. Cementitious materials.
  - 2. Admixtures.
  - 3. Form materials and form-release agents.
  - 4. Steel reinforcement and accessories.
  - 5. Curing compounds.
  - 6. Floor and slab treatments.
  - 7. Bonding agents.
  - 8. Adhesives.
  - 9. Vapor retarders.
  - 10. Semirigid joint filler.
  - 11. Joint-filler strips.
  - 12. Repair materials.
- H. Field quality-control test and inspection reports.
- I. Minutes of pre-installation conference.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, 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 ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."
- F. 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.
  2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- H. Pre-installation 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 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. Concrete subcontractor.
  2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, forms and form removal limitations, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

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

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

### 2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
1. Plywood, metal, or other approved panel materials.
  2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
    - a. High-density overlay, Class 1 or better.
    - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
    - c. Structural 1, B-B or better; mill oiled and edge sealed.
    - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- D. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.

### 2.3 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of pre-consumer recycled content is not less than 60 percent.

- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60, deformed.
- C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- D. Plain-Steel Wire: ASTM A 82.
- E. Deformed-Steel Wire: ASTM A 496.
- F. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.

## 2.4 REINFORCEMENT ACCESSORIES

- A. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
  - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

## 2.5 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.
    - a. Fly Ash: ASTM C 618, Class C.
    - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
  - 2. Blended Hydraulic Cement: ASTM C 595, Type IS, portland blast-furnace slag cement.
- B. Normal-Weight Aggregates: ASTM C 33, Class 3S coarse aggregate or better, graded. Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
  - 1. Maximum Coarse-Aggregate Size: 1-1/2 inches nominal.
  - 2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M and potable.

## 2.6 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.

- 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 C 494/C 494M, Type A.
  2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
- C. Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete and complying with ASTM C 494/C 494M, Type C.
1. Products:
    - a. Boral Material Technologies, Inc.; Boral BCN.
    - b. Euclid Chemical Company (The); Eucon CIA.
    - c. Grace Construction Products, W. R. Grace & Co.; DCI.
    - d. Master Builders, Inc.; Rheocrete CNI.
    - e. Sika Corporation; Sika CNI.
- D. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
1. Products:
    - a. Boral Material Technologies, Inc.; Boral BCN2.
    - b. Cortec Corporation; MCI 2000.
    - c. Grace Construction Products, W. R. Grace & Co.; DCI-S.
    - d. Master Builders, Inc.; Rheocrete 222+.
    - e. Sika Corporation; FerroGard-901.

## 2.7 VAPOR RETARDERS

- A. Plastic Vapor Retarder: Refer to Specification Section 072600 for requirements.
- B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch sieve and 0 to 5 percent passing a No. 8 sieve.

## 2.8 FLOOR AND SLAB TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.

1. Products:

- a. Curecrete Distribution Inc.; Ashford Formula.
- b. Dayton Superior Corporation; Day-Chem Sure Hard.
- c. Euclid Chemical Company (The); Euco Diamond Hard.
- d. Meadows, W. R., Inc.; Liqui-Hard.
- e. Symons Corporation, a Dayton Superior Company; Buff Hard.

## 2.9 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.

1. Products:

- a. Dayton Superior Corporation; Sure Film.
- b. Euclid Chemical Company (The); Eucobar.
- c. Meadows, W. R., Inc.; Sealtight Evapre.
- d. Sika Corporation, Inc.; SikaFilm.
- e. Symons Corporation, a Dayton Superior Company; Finishing Aid.

- B. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

- C. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.

- D. Water: Potable.

- E. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating.

1. Products:

- a. Dayton Superior Corporation; Day Chem Rez Cure (J-11-W).
- b. Euclid Chemical Company (The); Kurez DR VOX.
- c. Meadows, W. R., Inc.; 1100 Clear.
- d. Symons Corporation, a Dayton Superior Company; Resi-Chem Clear Cure.
- e. Vexcon Chemicals, Inc.; Certi-Vex Enviocure 100.

- F. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

## 1. Products:

- a. Dayton Superior Corporation; Safe Cure and Seal (J-18).
- b. Euclid Chemical Company (The); Aqua Cure VOX.
- c. Meadows, W. R., Inc.; Vocomp-20.
- d. Symons Corporation, a Dayton Superior Company; Cure & Seal 18 Percent E.
- e. Vexcon Chemicals, Inc.; Starseal 309.

G. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, 18 to 25 percent solids, nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.

## 1. Products:

- a. Dayton Superior Corporation; Safe Cure and Seal (J-19).
- b. Euclid Chemical Company (The); Diamond Clear VOX.
- c. Meadows, W. R., Inc.; Vocomp-20.
- d. Symons Corporation, a Dayton Superior Company; Cure & Seal 18 Percent E.
- e. Vexcon Chemicals, Inc.; Starseal 0800.

H. Clear, Solvent-Borne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

## 1. Products:

- a. Burke by Edoco; Cureseal 1315.
- b. Dayton Superior Corporation; Day-Chem Cure and Seal (J-22UV).
- c. Euclid Chemical Company (The); Super Diamond Clear.
- d. Sonneborn, Div. of ChemRex; Kure-N-Seal 5.
- e. Vexcon Chemicals, Inc.; Certi-Vex AC 1315

I. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

## 1. Products:

- a. Euclid Chemical Company (The); Super Diamond Clear VOX.
- b. Meadows, W. R., Inc.; Vocomp-30.
- c. Symons Corporation, a Dayton Superior Company; Cure & Seal 31 Percent E.
- d. US Mix Products Company; US Spec Radiance UV-25.
- e. Vexcon Chemicals, Inc.; Vexcon Starseal 1315.

## 2.10 RELATED MATERIALS

A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber.



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

## 2.11 REPAIR MATERIALS

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

## 2.12 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
  - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:

1. Fly Ash: 25 percent.
  2. Combined Fly Ash and Pozzolan: 25 percent.
  3. Ground Granulated Blast-Furnace Slag: 50 percent.
  4. Combined Fly Ash or Pozzolan and Ground Granulated Blast-Furnace Slag: 50 percent portland cement minimum, with fly ash or pozzolan not exceeding 25 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
1. Use water-reducing, high-range water-reducing, or plasticizing admixture in concrete, as required, for placement and workability.
  2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
  4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.

## 2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Footings: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3500 psi at 28 days.
  2. Maximum Water-Cementitious Materials Ratio: 0.50.
  3. Slump Limit: 4 inches, plus or minus 1 inch.
  4. Air Content: 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
- B. Slabs-on-Grade: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3500 psi at 28 days.
  2. Maximum Water-Cementitious Materials Ratio: 0.42.
  3. Slump Limit: 4 inches, plus or minus 1 inch.
  4. Air Content: 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.
  5. Air Content: Do not allow air content of troweled finished floors to exceed 3 percent.
- C. Concrete Toppings: Proportion normal-weight concrete mixture as follows:
1. Minimum Compressive Strength: 3500 psi at 28 days.
  2. Slump Limit: 4 inches, plus or minus 1 inch.
  3. Air Content: 5-1/2 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch nominal maximum aggregate size.

## 2.14 FABRICATING REINFORCEMENT

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

## 2.15 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
  - 1. When air temperature is between 85 and 90 deg F, reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F, reduce mixing and delivery time to 60 minutes.
- B. Project-Site Mixing: Measure, batch, and mix concrete materials and concrete according to ASTM C 94/C 94M. Mix concrete materials in appropriate drum-type batch machine mixer.
  - 1. For mixer capacity of 1 cu. yd. or smaller, continue mixing at least 1-1/2 minutes, but not more than 5 minutes after ingredients are in mixer, before any part of batch is released.
  - 2. For mixer capacity larger than 1 cu. yd., increase mixing time by 15 seconds for each additional 1 cu. yd.
  - 3. Provide batch ticket for each batch discharged and used in the Work, indicating Project identification name and number, date, mixture type, mixture time, quantity, and amount of water added. Record approximate location of final deposit in structure.

## PART 3 - EXECUTION

### 3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
  - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
  - 2. Class B, 1/4 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete

surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.

1. Install keyways, reglets, recesses, and the like, for easy removal.
  2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- H. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- I. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- J. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

### 3.2 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
  2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

### 3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.

- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

### 3.4 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Lap joints 6 inches and seal with manufacturer's recommended tape.
- B. Bituminous Vapor Retarders: Place, protect, and repair vapor retarders according to manufacturer's written instructions.

### 3.5 STEEL REINFORCEMENT

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

### 3.6 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  - 1. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
  - 2. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

3. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
  2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint, where noted.

### 3.7 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, 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 in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.

1. Deposit concrete in horizontal layers of depth 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 301.
  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 into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  2. Maintain reinforcement in position on chairs during concrete placement.
  3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  4. Slope surfaces uniformly to drains where required.
  5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

### 3.8 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces exposed to public view.
- C. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

### 3.9 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in 1 direction.
  - 1. Apply scratch finish to surfaces to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
  - 1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing, built-up or membrane roofing, or sand-bed terrazzo.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.



2. Finish and measure surface so gap at any point between concrete surface and an unveled, freestanding, 10-foot- long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/4 inch.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

### 3.10 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.

### 3.11 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
1. Moisture Curing: Keep surfaces 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 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, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
  - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
  - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.
  - a. After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.
4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a 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. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

### 3.12 LIQUID FLOOR TREATMENTS

- A. Penetrating Liquid Floor Treatment: Prepare, apply, and finish penetrating liquid floor treatment according to manufacturer's written instructions.
  1. Remove curing compounds, sealers, oil, dirt, laitance, and other contaminants and complete surface repairs.
  2. Do not apply to concrete that is less than three days' old, and as recommended by manufacturer.
  3. Apply liquid until surface is saturated, scrubbing into surface until a gel forms; rewet; and repeat brooming or scrubbing. Rinse with water; remove excess material until surface is dry. Apply a second coat in a similar manner if surface is rough or porous.

- B. Sealing Coat: Uniformly apply a continuous sealing coat of curing and sealing compound to hardened concrete by power spray or roller according to manufacturer's written instructions.

### 3.13 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
  - 1. Defer joint filling until concrete has aged at least **[one]** **[six]** month(s). Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

### 3.14 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
  - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension in solid concrete, but not less than 1 inch in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
  - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  - 3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
2. After concrete has cured at least 14 days, correct high areas by grinding.
3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.

E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.

F. Repair materials and installation not specified above may be used, subject to Architect's approval.

### 3.15 FIELD QUALITY CONTROL

A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.

B. Inspections:

1. Steel reinforcement placement.
2. Steel reinforcement welding.
3. Headed bolts and studs.
4. Verification of use of required design mixture.
5. Concrete placement, including conveying and depositing.

6. Curing procedures and maintenance of curing temperature.
  7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- C. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
  2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; ASTM C 173/C 173M, volumetric method, for structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F and below and when 80 deg F and above, and one test for each composite sample.
  5. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days. Maintain a 5<sup>th</sup> cylinder in reserve for testing at 56 days as required.
    - a. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
  6. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
  7. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
  8. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
  9. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.

10. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
  11. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
  12. Correct deficiencies in the Work that test reports and inspections indicate dos not comply with the Contract Documents.
- D. Measure floor and slab flatness and levelness according to ASTM E 1155 within 24 hours of finishing.

END OF SECTION 033000

**SECTION 033500**  
**CONCRETE SEALERS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Related Sections:
  - 1. Section 018119 – Construction Indoor Air Quality (IAQ) Requirements: Indoor air quality procedures for LEED projects.
  - 2. Section 031000 - Concrete Forming and Accessories: Surface retarders for exposed aggregate finish.
  - 3. Section 033000 - Cast-in-Place Concrete.
- B. This Project is a registered US Green Building Council “LEED” project.
  - 1. Sealers must not exceed the VOC and chemical component limits of South Coast Air Quality Management District Rule #1113.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit product data, including chemical properties and percentage of solids, for each product.
- C. Samples:
  - 1. Submit one 12 inch by 18 inch concrete sample for each sealer specified.
  - 2. Coat one-half of each sample with sealer and leave one-half untreated.
  - 3. Samples shall illustrate range of texture expected in final Work.
  - 4. Resubmit samples until approved.
- D. Submit following Informational Submittals:
  - 1. Certifications specified in Quality Assurance article.
  - 2. Qualification Data: Applicator's qualification data.
  - 3. Manufacturer's Instructions: Application instructions, including surface preparation and application rates for each type of substrate, methods, and techniques.
- E. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit EQc4.2: Provide sealer VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
    - a. Concrete Sealers

**1.3 QUALITY ASSURANCE**

- A. Applicator's Qualifications: Company specializing in performing work of this Section with 3 years minimum experience.
- B. Certifications:
  - 1. Submit manufacturer's certificate stating proper amount of materials was ordered and shipped to Project.
  - 2. Submit sealer manufacturer's certificate indicating review of Project conditions and intent to issue extended warranty. Submittal of certificate is required prior to application of materials.

**1.4 FIELD SAMPLES**

- A. General: Comply with provisions of Section 014000.
- B. Cast and finish three 4 foot by 4 foot sample panels with dry shake hardener finish for Architect's review of color consistency and workmanship. Provide workmanship and procedures necessary to match Architect approved submittal.
- C. Maintain accepted sample application during construction as standard for Work.

- D. Architect's Review:
  - 1. Architect will review field sample for visual acceptance of materials and workmanship.
  - 2. Replace unsatisfactory Work as directed by Architect.
- E. Approved samples may remain as part of the Work.

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

- A. Conduct pre-installation conference in accordance with Section 013100.
- B. Arrange for manufacturer's technical representative to be on Project site to advise applicator of proper procedures and precautions and to observe application methods of products.

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

- A. Comply with requirements of Section 016000.
- B. Store products above 50 degrees F, but no greater than 85 degrees F, unless otherwise recommended by manufacturer.

### **1.7 ENVIRONMENTAL REQUIREMENTS**

- A. Do not apply materials when ambient or substrate surface temperatures are below 40 degrees F or higher than 100 degrees F.
- B. Do not apply during inclement weather or when forecasted conditions will not permit compliance with manufacturer's printed instructions.
- C. Provide mechanical ventilation during and after application to dissipate fumes if natural ventilation is insufficient.

### **1.8 SCHEDULING**

- A. Schedule application of products at proper time intervals after concrete finishing and curing operations.
- B. Maintain proper moisture content of concrete before, during, and after application of specified products.

### **1.9 WARRANTY**

- A. Comply with provisions of Section 017700.
- B. Warrant applied sealer system to be free of defects related to material deficiency and workmanship for 5 years.
- C. Warranty period begins at date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Provide materials, equipment, and personnel required to achieve specified finish.
- B. Water Based Acrylic Sealing Compounds:
  - 1. ASTM C1315, Type I, Class A, VOC compliant, free of natural or petroleum waxes. Dries clear with satin sheen.
  - 2. Locations: Exposed concrete without finished flooring, except for areas with Hardener Sealer specified below..
  - 3. Compatible with subsequent coatings and toppings.
  - 4. VOC Requirement: Less than 100 g/L
  - 5. Acceptable Products:
    - a. Super Diamond Clear VOX, Euclid Chemical Company.
    - b. Lumiseal WB Plus, L&M Construction Chemicals, Inc.
    - c. VOCOMP-30, W. R. Meadows.
- C. Curing, Hardener, Sealer Dustproofer:
  - 1. Liquid, penetrating, abrasion resistant compound, capable of curing, sealing, dustproofing, and densifying new concrete.



2. Colorless, non-yellowing liquid formulated for foot and vehicular traffic areas.
  3. Resists tire marking.
  4. Does not alter slip resistance of concrete.
  5. VOC compliant and USDA approved.
  6. Acceptable Products:
    - a. Ashford Formula, Curecrete Chemical Co., Inc.
    - b. Seal Hard, L&M Construction Chemicals, Inc.
    - c. Liqui-Hard, W.R. Meadows.
  7. Location: Apparatus Bay and adjacent areas indicated on Drawings.
- D. Sealers: Use sealers in the interior of the building that comply with VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113.
1. Current requirement refers to the date on which the materials are installed in the building.
  2. SCAQMD Rule #1113 referenced in Section 018113 is current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
  3. Interior refers to all building construction that is inside of the exterior weatherproofing material.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Verify that damage and defects in concrete surface have been repaired as specified in Section 033000 and accepted by Architect.
- C. Verify that form ties have been broken off below concrete surface and plastic cones, fins and burrs have been removed.
- D. Verify that form tie holes have been patched, unless specifically indicated to be left unfilled.
- E. Verify that surfaces are clean, dry, dust free, and free of efflorescence, oil or other matter detrimental to sealer and hardener application.
- F. Verify that joint sealant work in adjoining surfaces is complete prior to applications of sealers. Delay application until sealants have cured.
- G. Ensure concrete has cured for time period required by manufacturer of product to be applied before application of products.

#### **3.2 PREPARATION**

- A. Provide protection as necessary to protect adjacent materials and surfaces from dirt, dust, and other surface or physical damage.
- B. Prevent migration of airborne materials by use of tarpaulins, wind breaks, and similar containment devices.
- C. Maintain control of concrete chips, dust and debris. Collect water to prevent damage to adjacent surfaces.
- D. Remove loose particles, foreign matter, and oil by method which will not affect sealer and hardener application.
- E. Prepare surfaces in accordance with manufacturer's directions.
- F. Provide protection as necessary to protect adjacent materials and surfaces from dirt, dust, spillage, overspray and other surface or physical damage.

#### **3.3 APPLICATION**

- A. General:
  1. Provide finishes to match approved samples at locations indicated.
  2. Apply materials in accordance with manufacturer's printed instructions.

- B. Liquid Membrane-Forming Sealer and Hardeners:
  - 1. Apply sealer using low pressure airless sprayer in single coat at 400 to 600 ft/gal coverage unless greater amount is recommended by manufacturer to obtain penetration and full coverage.
  - 2. Do not allow flooding or puddling of material on surface.
  - 3. Do not dilute or alter material as packaged.

**3.4 ADJUSTING**

- A. Repair or replace adjacent Work which has been damaged by finishing operations.

**3.5 CLEANING**

- A. Clean-up and remove debris daily.
- B. Clean spillage, overspray, or drift from adjacent surfaces; remove immediately in accordance with manufacturer's instructions.

**3.6 PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. Protect finished concrete surfaces from damage by construction equipment, operations and from adverse weather conditions.

**END OF SECTION**

**SECTION 042000****UNIT MASONRY****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select locally or regionally fabricated products wherever possible.
- B. Products Furnished But Not Installed Under This Section:
  - 1. Section 031000 - Concrete Formwork and Concrete Accessories: Deliver dovetail slots to concrete trade for building into formwork.
- C. Related Sections:
  - 1. Section 072100 - Building Insulation: Bat and board Insulation.
  - 2. Section 072700 – Air Barriers.
  - 3. Section 076000 – Flashing and Sheet Metal.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit product data for each type masonry unit, accessory, mortar, mortar color, masonry cleaning agent and other proprietary products.
- C. Shop Drawings: Submit details for following:
  - 1. Through wall flashing, including splice joints.
  - 2. Flashing at masonry openings, including end dams.
  - 3. Flashing at corner conditions.
  - 4. Flashing at parapets.
- D. Samples:
  - 1. Brick: 3 sets of 5 individual units of each type illustrating extreme variations in color and texture in manufacturer's standard range.
  - 2. Mortar: Three 6 inch long samples by mortar joint thickness illustrating each color required representing extreme variations in color to be expected. Label samples to indicate type and amount of colorant. Include mortar strength.
  - 3. Accessories: Each type of anchor, tie, screw, fastener, weep hole, vent, and joint filler material.
- E. Submit following Informational Submittals:
  - 1. Test Reports:
    - a. Submit test reports, in triplicate for each type of brick, CMU, and mortar, from independent testing laboratory certifying that materials meet or exceed specified requirements.
  - 2. Certifications specified in Quality Assurance article.
  - 3. Qualification Data: Installer's qualification data.
  - 4. Manufacturer's instructions.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Mortars
    - b. Brick.
    - c. CMU.
  - 2. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
    - a. Mortars
    - b. Brick.
    - c. CMU.

**1.3 QUALITY ASSURANCE**

- A. Single Source Responsibility:
  - 1. Obtain brick of uniform texture and color, or uniform blend within ranges accepted for these characteristics, from one manufacturer for each product required.
  - 2. Obtain exposed CMU of uniform texture and color from one manufacturer for each different product required for each continuous surface or visually related surfaces.
  - 3. Obtain mortar ingredients from one manufacturer for each cementitious component and from one source and producer for aggregate.
- B. Installer Qualifications: Documented experience on at least 5 projects of similar nature in past 5 years.
- C. Owner reserves right to hire independent masonry consultant to review submittals, procedures, and installation. Installation items subject to review includes, but is not limited to, foundations, flashing, weeps, cavities, joints, tolerances, and cleaning.
- D. Certifications:
  - 1. Submit manufacturer's certificates attesting that materials furnished meet or exceed specified requirements.
  - 2. Provide certification of acceptance of masonry cleaning agent by masonry unit, mortar, and mortar color manufacturer.

**1.4 FIELD SAMPLES**

- A. General: Comply with provisions of Drawing Sheet A-053 and Section 014000.
- B. Sample Installation:
  - 1. Construct field sample 6 feet long by 4 feet high.
  - 2. Locate on site where directed.
  - 3. Show construction techniques, including following:
    - a. Color range of exposed masonry and mortar joints.
    - b. Tooled joints.
    - c. Back-up CMU conditions, including exposed joint work.
    - d. Base course with flashing and weeps.
    - e. Cavity wall insulation.
    - f. Air barrier membrane and transitions.
    - g. Window sill and head with flashing end dam.
    - h. Shelf angle (including expansion joint condition).
    - i. Expansion and control joints.
    - j. Ties, anchors, and fasteners.

**1.5 PRE-INSTALLATION CONFERENCE**

- A. Conduct pre-installation conference in accordance with Section 013100.
- B. Attendees: Trades affected by masonry installation.
- C. Review requirements of Contract Documents and submittals.
- D. Review requirements for inspection and testing, forecasted weather conditions, governing regulations, insurance requirements, and proposed installation procedures and sequencing.
- E. Review anchor, tie, and flashing installation requirements.
- F. Review requirements of field sample on site.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Masonry:
  - 1. Store masonry units off ground to prevent contamination by mud, dust or materials likely to cause staining or other defects.
  - 2. Cover materials to protect from elements.
  - 3. Handle units on pallets or flat bed wheel barrows.

4. Do not permit free discharge from conveyor units or transporting loose in mortar trays or buggies.
- C. Mortar Materials:
  1. Protect packaged products against contamination and moisture.
  2. Stockpile and handle aggregates to prevent contamination from foreign materials.
  3. Store admixtures to prevent contamination or damage from excessive temperature changes.
  4. Keep water free of harmful materials.
- D. Accessories: Protect from damage, moisture, weather, distortion, and from being coated with foreign material.

## 1.7 PROJECT CONDITIONS

- A. Environmental Requirements:
  1. Cold Weather Requirements:
    - a. Follow construction and protection requirements in Brick Industry Association (BIA) Technical Note No. 1, "Cold and Hot Weather Construction" if surrounding air temperature falls below 40 degrees F.
    - b. Mortar setting accelerators and admixtures for cold weather construction are not permitted.
  2. Hot Weather Requirements:
    - a. Protect masonry construction from direct exposure to wind and sun when erected in ambient air temperature of 99 degrees F or greater in the shade with relative humidity less than 50 percent.
    - b. When ambient air temperature exceeds 99 degrees F, or 90 degrees F with wind velocity in excess of 8 mph, limit installation of mortar to 4 feet ahead of masonry and install masonry within one minute of spreading mortar.

## PART 2 - PRODUCTS

### 2.1 BRICK

- A. Face Brick:
  1. Standard: ASTM C216.
  2. Type: FBS.
  3. Grade: SW.
  4. Model: Modular Ridgley Composition : 75% Unflashed mixed w/ 25% Flashed in masonry wall
  5. Basis of Design: Manufacturer: Carolina Ceramics
  6. Other Manufacturers:
    - a. Glen-Gery Brick
    - b. L. C. Smith Brick
- B. Special Shapes:
  1. Where indicated and for application requiring masonry of form, size and finish on exposed surfaces which cannot be produced from standard brick sizes by sawing.
  2. Provide 100 percent solid units without core holes where core holes or "frogs" would be exposed to view or weather when in final position.
  3. Schedule delivery of special shapes with that of other brick.

### 2.2 CONCRETE MASONRY UNITS

- A. Concrete Masonry Units (CMU):
  1. Standard: ASTM C90, load bearing, hollow units.
  2. Weight Classification: Normal weight, greater than 125 lb/ft<sup>3</sup>.
  3. Aggregate: Normal weight, ASTM C33.
  4. Type: II, non-moisture controlled.
  5. Size: Nominal face dimension 16 inches long by 8 inches high by thickness indicated.
  6. Shapes: Provide special shapes where required for bond beams, lintels, corners, jambs, sash, control joints, pilasters, headers, and other special conditions.
  7. Corners: Bullnose units for outside corners exposed to view, unless indicated otherwise.

8. Standard Faces: Manufacturer's standard texture and color, unless indicated otherwise.

### 2.3 MORTAR AND GROUT MATERIALS

- A. Proprietary Masonry Cement: Not permitted.
- B. Portland Cement: ASTM C150, normal-Type I; gray color.
- C. Hydrated Lime: ASTM C207, Type S.
- D. Precolored Blend Portland Cement and Lime Mortar:
  - 1. Standards:
    - a. Portland cement: ASTM C150, Type 1.
    - b. Hydrated lime: ASTM C207, Type S.
    - c. Color pigments: ASTM C979.
  - 2. Color: As selected by Architect.
  - 3. Provide premix mortar with integral water repellent admixture that does not reduce flexural bond strength and that is compatible with water repellent in CMU.
  - 4. Acceptable Products:
    - a. Color Mortar Blend, Glen-Gery Corporation, Wyomissing, PA.
    - b. Centurion Colorbond PL, Lehigh Portland Cement Co.
    - c. Riverton Portland Cement Lime Custom Color, Riverton Corporation.
    - d. AMX 400 Series Portland Lime Colored Mortar, AmeriMix.
    - e. Spec-Mix Portland Lime & Sand Mortar, Spec-Mix.
- E. Mortar Aggregate: ASTM C144, except graded to pass No. 16 sieve for joints 1/4 inch or less.
- F. Grout Aggregate: ASTM C404, sizes #1, #8, or #89.
- G. Water: Clean and drinkable.

### 2.4 ACCESSORIES

- A. Acceptable Manufacturers:
  - 1. Heckmann Building Products, Inc., Chicago, IL.
  - 2. Hohmann and Barnard, Inc., Hauppauge, NY.
- B. Corrugated Metal Ties: Not permitted.
- C. Adjustable Veneer Anchors:
  - 1. Type: Seismic type.
    - a. Adjustable design, hot dipped galvanized, 14 gage steel anchor plate with 3/16 inch diameter double legged pintle tie.
    - b. "Eye" section no greater than 1/4 inch diameter and pintle legs with bends at 1-1/4 inches from top of leg to allow up or down misalignment from one course to another of 1-1/4 inches and minimum engagement of pintle into eye of 3/4 inches.
  - 2. Size: Tie to extend to within 1 inch of outside face of masonry with cavity wall insulation.
  - 3. Finish: ASTM A153, Class B-2, minimum 1.50 ounce per sq ft zinc coating.
  - 4. Fasteners: Self-drilling, self-tapping, No. 10 screw with co-polymer coating or zinc coated finish; criteria to meet anchor manufacturer's requirements; length to suit Project conditions. Two fasteners minimum per plate.
  - 5. Acceptable Product: HB-200-HS with SeismiClip, Hohmann & Barnard.
- D. Contractor Option - Continuous Insulation Seismic Masonry-Veneer Anchors: Units consisting of a single screw metal anchor section for metal studs and a connector section designed to engage a continuous wire embedded in the veneer mortar joint, complying with the following requirements:
  - 1. Finish: Hook and Wire - ASTM A153, Class B-2, minimum 1.50 ounce per sq ft zinc coating; screw and barrel – stainless steel.
  - 2. Fabricate wire from 0.1875-inch diameter, hot-dip galvanized steel wire.
  - 3. Acceptable Product: HB-Thermal 2-Seal Wing Nut Anchor with 2X-Seismic Hook and SeismiClip, Hohmann & Barnard.
- E. Horizontal Joint Reinforcing:
  - 1. Type: Standard ladder design, fabricated from ASTM A82 cold-drawn steel wire.
  - 2. Side rods: Two or more continuous 9 gage deformed side rods butt welded in same plane to continuous perpendicular 9 gage plain cross rod at 16 inches on centers maximum.

3. Size: Standard length 10 to 20 feet; side rods spaced approximately 2 inches less than width of partition or wall in which placed.
  4. Finish: Exterior walls; ASTM A153, Class B-2, (minimum 1.5 ounce per sq. ft. zinc coating) hot-dip galvanized.
  5. Provide prefabricated tee and corner units.
- F. Seismic Horizontal Joint Reinforcing and Wall Tie Combination:
1. Type: Combination ladder and tie design, fabricated from ASTM A82 cold-drawn steel wire with:
    - a. Two or more continuous 9 gage deformed side rods butt welded in same plane to continuous perpendicular 9 gage plain cross rod at 16 inches on centers maximum.
    - b. Anchor Section: Rib-stiffened, sheet metal plate with clip slots for inserting into ladder wire section.
    - c. Connector Section: Rib-stiffened, sheet metal bent plate with down-turned leg designed to fit in anchor section slot and with integral tabs designed to engage continuous wire. Size connector to extend at least halfway through veneer but with at least 5/8-inch cover on outside face.
  2. Finish: ASTM A153, Class B-2, minimum 1.50 ounce per sq ft zinc coating.
  3. Fabricate wire from 0.1875-inch diameter, hot-dip galvanized steel wire.
  4. Size: Standard length 10 to 20 feet; side rods spaced approximately 2 inches less than width of partition or wall in which placed.
  5. Finish: Exterior walls; ASTM A153, Class B-2, (minimum 1.5 ounce per square feet zinc coating) hot-dip galvanized.
  6. Provide prefabricated tee and corner units.
  7. Acceptable Product: #170 Truss Lox-All Adjustable Eye-Wire with SH Seismic Hook, Hohmann and Barnard.
- G. Steel Plate and Bar Anchors:
1. Type: ASTM A36 steel.
  2. Finish: Galvanized; ASTM A153, Class B-2 zinc coating.
- H. Cast Stone Anchors: Refer to Section 047200.
1. Finish: Stainless steel.
- I. Reinforcing Bars: Deformed steel, ASTM A615, Grade 60.
- J. Weeps and Cavity Vents:
1. One-piece plastic type ventilators to provide weep holes and cavity ventilation and prevent insect entry.
  2. Sized to fit in vertical mortar head joint.
  3. Acceptable Products:
    - a. #QV - Quadro-Vent by Hohmann and Barnard.
    - b. Cavity Vent Weep System, Heckmann Building Products.
- K. Expansion Joint Fillers:
1. Type:
    - a. Closed cell neoprene complying with ASTM D1056, Class RE41.
    - b. Compatible with sealant.
    - c. Self adhering on one side; 50 percent minimum compressibility.
  2. Size: Thickness to suit joint size; depth to allow sealant application.
  3. Locations: Vertical expansion joints, horizontal joints at head of masonry terminating below shelf angles, beams, or slabs; other locations as detailed.
- L. CMU Control Joint Strips:
1. Preformed rubber compound to fit standard sash block.
  2. ASTM D2000, Designation 2AA-805.
  3. Hardness: 80.
- M. Masonry Cleaning Agents:
1. Non acidic cleaning solution formulated to avoid damage to masonry, mortar, mortar color, and adjacent surfaces.
  2. Material and application must be acceptable to masonry manufacturer.

- N. Cavity Wall Insulation: Refer to rigid extruded polystyrene type specified in Section 072100.
- O. Air Barrier: Refer to Section 072700.

## **2.5 FLASHING MATERIALS**

- A. Through Wall Flashing - Stainless Steel: ASTM A167, Type 302/304, 2D annealed finish, soft temper, 0.019 inch thick minimum; shop fabricated. Coordinate with Section 076000.
- B. Accessories: Provide solder, sealants, stainless steel termination bars, and mastics as required by flashing manufacturer to maintain flashing joints watertight.

## **2.6 MORTAR AND GROUT MIXES**

- A. Mortar:
  - 1. ASTM C270 using Proportion Method or BIA M1 Proportion Method.
  - 2. Limit cementitious materials to portland cement and hydrated lime.
  - 3. Use Type M for masonry below grade and in contact with earth, and where indicated.
  - 4. Use Type S for concrete unit masonry.
  - 5. Use Type N for brick locations, unless noted otherwise.
  - 6. Use Type N for all other locations, unless noted otherwise.
- B. Site Mixed Mortar: Combine and thoroughly mix cement, aggregates, and water in mechanical batch mixer. Use proportion measuring method to ensure accuracy and consistency; shovel method is not acceptable.
- C. Premix Mortar: Thoroughly mix premix colored mortar, sand, and water in mechanical batch mixer.
- D. Grout:
  - 1. Do not add admixtures including coloring pigments, air-entraining agents, accelerators, retarders, water repellent agents, antifreeze compounds, or other admixtures, unless otherwise indicated.
  - 2. ASTM C476, fine aggregate in spaces less than 2 inches.
  - 3. Proportion to produce 2500 psi compressive strength at 28 days with 9-1/2 inch slump when placed.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Verify items provided by other Sections of work are properly sized and located.
- C. Examine foundations and supporting members to ensure surfaces are within tolerances, at proper elevations, and are free from dirt or other deleterious matter.
  - 1. Verify concrete foundations comply with ACI 117 for concrete construction tolerances.

### **3.2 PREPARATION**

- A. Receive approval for required field sample before proceeding masonry work.
- B. Supply dovetail anchor slots to other trades for installation. Coordinate placement.
- C. Establish lines, levels, and coursing; protect from disturbance.
- D. Provide temporary bracing during erection of masonry work. Maintain in place until building structure provides permanent support.
- E. Provide temporary supports under masonry support systems when necessary. Retain in place until mortar has attained adequate strength.
- F. Wetting Masonry:
  - 1. CMU: Do not wet concrete masonry units.
  - 2. Brick:
    - a. Wet brick made from clay or shale which have initial rates of absorption (suction) of more than 30 grams per 30 square inches per minute when tested in accordance with ASTM C67.



- b. Use wetting methods recommended by manufacturer to achieve optimum bonding with mortar.

### 3.3 INSTALLATION

- A. Tolerances: Remove work not conforming to specified tolerances and reconstruct to proper tolerances.
  1. Variation from Plumb: 1/4 inch per story non-cumulative; 3/8 inch maximum in two stories or more.
  2. Variation from Level Coursing: 1/8 inch in 3 feet; 1/4 inch in 10 feet; 1/2 inch maximum.
  3. Variation from Unit to Adjacent Unit: 1/32 inch maximum.
  4. Variation from Plan Location: 1/4 inch in 10 feet and 1/2 inch maximum in 20 feet or more.
  5. Alignment of Columns: Maximum 1/4 inch from true line.
  6. Variation in Sizes of Wall Openings: Minus 0 inch to plus 1/4 inch.
  7. Variation in Location of Wall Openings: Plus or minus 1/4 inch.
  8. Variation of Joint Thickness: 1/8 inch in 3 feet.
  9. Maximum Variation from Cross Sectional Thickness of Walls: Plus or minus 1/4 inch.
- B. Flashing:
  1. Clean surfaces to receive flashing; remove rough projections to avoid damage to flashing.
  2. Extend flashings through brick veneer, turn up minimum of 8 inches in cavity, secure flashing into substrate or reglet.
  3. Lap joints minimum of 4 inches and seal with manufacturer's recommended materials.
  4. Continue flashing around corners. Ensure flashing material is not interrupted in horizontal plane at corners.
  5. Extend flashing 1/4 inch beyond outside face of brick and bend downward at 45 degree angle to create water drip.
  6. Lay masonry units, without mortar bed, directly on top of flashing which occurs over steel lintels or shelf angles only.
  7. Where flashing does not extend continuously for full length of wall (such as over lintels and under sills at openings) form watertight end dams at each end of flashing into brick head joints.
  8. Coordinate with air barrier system. Integrate stainless steel flashing with air barrier using transition strips. Refer to Section 072700.
  9. Coordinate elevation above throughwall flashing to allow for air barrier continuity.
- C. General:
  1. Except as indicated otherwise, place masonry in full bed of mortar, properly jointed with other work, to lines and levels indicated. Align head joints plumb within vertical tolerance.
  2. Maintain masonry courses to uniform width. Make vertical and horizontal joints equal and of uniform thickness.
  3. Apply mortar to obtain full vertical head joints.
  4. Slushing of head joints or furrowing of bed joints is prohibited.
  5. Lay brick in running bond. Course 3 brick units and 3 mortar joints to equal 8 inches.
  6. Lay CMU in running bond. Course one block unit and one mortar joint to equal 8 inches.
  7. Fully bond intersections, external corners and internal corners, except where indicated otherwise.
  8. Do not shift or tap masonry units after mortar has taken initial set. Where adjustment must be made, remove mortar and replace.
  9. Remove excess mortar as work progresses.
  10. Perform Project site cutting with proper tools to provide straight unchipped edges. Take care to prevent breaking masonry unit corners or edges.
  11. Form flush mortar joints where interior resilient base is indicated.
  12. Form flush mortar joints for exterior below grade work where scheduled to receive waterproofing. Form concave mortar joints for other work.
  13. Provide pressure relieving joints at top of non-loadbearing walls by placing continuous joint filler (no mortar) in horizontal joint immediately beneath shelf angle or structure.
  14. Isolate masonry partitions from vertical structural framing members with a control or expansion joint as indicated.

15. Provide pressure relieving joints by placing continuous joint filler (no mortar) in horizontal joint immediately beneath shelf angle.
16. Place joint filler in brick expansion joints.
17. Place control joint strips in CMU control joints.
18. Do not install cracked, broken, or chipped masonry.

D. Cavity Wall:

1. Mortar Boards:
  - a. Maintain cavity clear of excess mortar and debris.
  - b. Prevent accumulation of mortar droppings by placing boards in cavity, cut slightly narrower than cavity width, and supported on wall ties.
  - c. When masonry reaches next level for placement of reinforcement, raise boards by attached wires at ends and discard debris from boards.
  - d. Replace mortar dropping boards on ties for next courses.
  - e. Continue process as work progresses to top of wall.
2. Build inner wythe ahead of outer wythe to receive spray on air barrier and cavity wall insulation. Self-adhered membranes require flush-struck mortar joints.
3. Coordinate placement and provisions for air barrier and board insulation with Sections 072700 and 072100.
4. Cavity Drainage Material: Place cavity drainage material immediately above flashing in cavities.

E. Masonry Lintels and Bond Beams:

1. For hollow concrete masonry unit walls, use specially formed bond beam units with reinforcement bars placed as indicated and filled with coarse grout.
2. Provide minimum bearing of 8 inches at each jamb, unless otherwise indicated.
3. Provide bond beams at top of walls and other locations where indicated; provide masonry lintels above door openings where indicated.
4. Reinforce bond beams and lintels with minimum of two No. 5 bars and fill solid with grout.
5. Discontinue bond beams at control and expansion joints.

F. Loose Steel Lintels: Grout cells in CMU immediately below steel lintels.

### 3.4 ACCESSORIES

A. Unless otherwise indicated, install veneer anchors and ties within limits specified below.

1. Provide minimum of one anchor or tie for each 1.77 square feet of wall surface.
2. Maximum distance between adjacent ties or anchors:
  - a. Vertically - 16 inches.
  - b. Horizontally - 16 inches.

B. Adjustable Veneer Anchors and Ties:

1. Install anchors and ties in accordance with manufacturer's requirements.
2. Space at 16 inch centers maximum vertically and horizontally.
3. Screw attach through sheathing to metal studs and embed tie in midpoint of mortar joint.

C. Horizontal Joint Reinforcement and Adjustable Ties:

1. Use horizontal joint reinforcement with adjustable ties where coursing does not align, cavity walls occur, or interior wythe is built ahead of exterior wythe.
2. Place reinforcement centered in interior and exterior masonry walls in every second bed joint (16 inches on centers). Place reinforcement in first and second bed joints (8 inches on centers) above and below openings in masonry walls.
3. Where possible, extend the reinforcement in the second bed joint above and below openings at least 24 inches beyond each side of the opening.
4. Lap ends of reinforcement a minimum of 6 inches at splices and cut and bend corners in accordance with the manufacturer's instructions. Do not lap corners of reinforcement. Center reinforcement side rods over the outside face shell of hollow units.
5. Do not extend horizontal joint reinforcement through control or expansion joints in masonry walls.
6. Attach adjustable anchors to connectors and embed into mortar.

- D. Weeps and Cavity Vents:
  - 1. Use plastic type ventilators to provide weep holes and cavity ventilation through head joints of each brick course immediately above flashings and at top of wall below copings and shelf angles.
  - 2. Space 24 inches on center maximum.
  - 3. Keep weep head joints free from mortar.

### 3.5 MOVEMENT JOINTS

- A. Brick:
  - 1. Vertical Expansion Joints: Install joint fillers through brick veneer walls where indicated on Drawings and at building expansion joints. If joints are not indicated, install as noted below:
    - a. 20'-0" centers maximum run of uninterrupted wall.
    - b. 15'-0" centers maximum run for parapets, balconies, free standing walls and their junctions with walls of building proper.
    - c. Openings greater than 24 inches wide.
    - d. Between 1 and 4 feet of corners and offsets.
    - e. Where wall changes thickness, height, or direction.
  - 2. Horizontal Expansion Joints: Install joint fillers in joint underneath shelf angles, beams, slabs, and decks.
- B. CMU Joints:
  - 1. Install control joints to coincide with brick expansion joints in cavity walls, elsewhere indicated. If joints are not indicated, install as noted below:
    - a. Changes in thickness, height, and direction of wall.
    - b. Between 1 and 4 feet of corners and offsets.
    - c. 20'-0" on centers maximum run of uninterrupted wall.
    - d. At control or expansion joints in structure.
    - e. At each side of openings greater than 24 inches.
  - 2. Ensure joint is free from mortar and horizontal reinforcing.
  - 3. Horizontal joints: Install joint fillers in joint underneath shelf angles, beams, slabs, and decks for nonbearing wall applications.

### 3.6 BUILT-IN WORK

- A. As work progresses, build in metal frames, window frames, plates, and other items to be built in work supplied by other sections.
- B. Build in items plumb and level to tolerances indicated.
- C. Do not build-in organic materials subject to deterioration.
- D. Bed anchors of metal frames in mortar joints.

### 3.7 ADJUSTING

- A. Cut out and repoint defective mortar joints to match adjacent work.
- B. During tooling of joints, enlarge voids and holes and completely fill with mortar matching adjacent.
- C. Remove and replace masonry units which are loose, chipped, broken, stained, or otherwise damaged. Provide new units to match adjoining units and install in fresh mortar pointed to eliminate evidence of replacement.

### 3.8 CLEANING

- A. After mortar has set dry brush brick face to remove excess mortar, smears and stains prior to end of each work day.
- B. Test cleaning products at field sample panel or other location as directed.
- C. Clean stained surfaces with non-acidic solution of type which will not harm masonry or adjacent materials. Follow manufacturer's instructions. Consult masonry manufacturer for acceptable cleaners.
- D. Do not allow cleaning solution to etch mortar joints, masonry, foundations, or windows.
- E. Cleaning tools: Non-metallic.

- F. Clean-up debris and refuse created by masonry work and remove from site.

### **3.9 PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. General:
  - 1. Prevent mortar from staining exposed brick and CMU faces.
  - 2. Protect sills, ledges, and projections from mortar droppings or other damage during construction.
  - 3. Maintain protective boards at exposed external corners, sills, ledges, and projections to avoid damage by construction activities.
  - 4. Protect CMU walls from elements during construction.
- C. Wall Covers:
  - 1. Cover partially completed walls with impervious sheets when work is not in progress.
  - 2. Extend cover down 24 inches minimum on both sides of wall and secure in-place to prevent moisture infiltration and protect from weather.
- D. Protect wall at scaffold work platform. Turn-up scaffold boards at end of day to reduce mortar stains on walls during wet weather.
- E. After completion of masonry work protect top of walls until wall cap and flashings are in place.

**END OF SECTION**

**SECTION 047200**  
**CAST STONE MASONRY**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes: Cast stone masonry bands and water tables.
- B. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select locally or regionally fabricated products wherever possible.
- C. Related Sections:
  - 1. Section 042000 - Unit Masonry.

**1.2 REFERENCES**

- A. Reference Standards: In addition to requirements shown or specified, comply with applicable provisions of following for design, materials, fabrication, and installation of component parts:
  - 1. Cast Stone Institute Standard Specification 047200-04.

**1.3 DEFINITIONS**

- A. Cast Stone - a refined architectural concrete building unit manufactured to simulate natural cut stone, used in unit masonry applications.
  - 1. Dry Cast Concrete Products – manufactured from zero slump concrete.
    - a. Vibrant Dry Tamp (VDT) casting method: Vibratory ramming of earth moist, zero-slump concrete against a rigid mold until it is densely compacted.
    - b. Machine casting method: manufactured from earth moist, zero-slump concrete compacted by machinery using vibration and pressure against a mold until it becomes densely consolidated.
- B. Wet Cast Concrete Products – manufactured from measurable slump concrete.
  - 1. Wet casting method: manufactured from measurable slump concrete and vibrated into a mold until it becomes densely consolidated.

**1.4 SYSTEM REQUIREMENTS**

- A. Design Criteria:
  - 1. Cast Stone fabricator is responsible for preparing depicting sketches and fabrication of cast stone units, including anchorage to substrate, provisions required for adjoining materials, and necessary modifications to meet visual design concepts.
  - 2. Drawings are schematic and are intended to establish basic dimensions of units, sight lines, profiles, locations for connections to substrate and adjoining materials.
  - 3. Maintain general design concept without altering profiles or alignment.
  - 4. Units shall withstand gravity loads, superimposed dead loads, design live loads, and loads imposed during handling and erection.
  - 5. Connections: Capable of transmitting loads to substrate.
  - 6. Units shall be capable of withstanding loads and thermal movements within deflection limitations governed by attached elements.
- B. Architectural Cast Stone Properties:
  - 1. Compressive Strength, ASTM C 1194: 6500 psi min. for products at 28 days. or;
  - 2. Absorption, ASTM C 1195 or ASTM C642: 6% max. for products at 28 days.
  - 3. Multiply requirements of field cut or core drilled specimens by 80% to determine minimum compressive strength requirements.
- C. Interface With Adjacent Systems:
  - 1. Integrate connection design with substrate.
  - 2. Coordinate Work with masonry, sealants, and flashings.

**1.5 SUBMITTALS**

- A. General: Submit following items in accordance with Section 013300.

- B. Shop Drawings:
  - 1. Indicate shapes, sizes, reinforcement, methods of anchorages, and locations of joints.
  - 2. Include profiles, cross-sections, exposed faces, annotation of stone types and their location.
  - 3. Show suitable wash on all exterior cast stone projecting courses and pieces with exposed top surfaces.
  - 4. Show drips as needed.
- C. Samples: 12 inch by 12 inch by 1 inch sample. Representative of color, texture, and finish.
- D. Informational Submittals: Test results of Cast Stone previously made by the manufacturer.
- E. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Mortars
    - b. Cast Stone
  - 2. LEED Credit MRc5: Provide manufacturer name and location data for the following materials:
    - a. Mortars
    - b. Cast Stone

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

- A. Comply with requirements of Section 016000.
- B. Store cast stone at site off ground and cover at end of each day's work to protect from weather.

## **PART 2 - PRODUCTS**

### **2.1 PRODUCTS AND MANUFACTURER**

- A. Acceptable Manufacturer:
  - 1. W. N. Russell and Company, Collingswood, NJ.
  - 2. Continental Cast Stone Manufacturing, Inc., Huntington Beach, CA.
  - 3. Other – Member of Cast Stone Institute.

### **2.2 MATERIALS**

- A. Portland Cement: ASTM C150, Type I, White.
- B. Aggregate:
  - 1. Fine Aggregate: ASTM C33, silica sand passing No. 8 mesh.
  - 2. Coarse Aggregate: ASTM C33, except gradations and are optional for VDT casting method. Granite, quartz, or limestone to provide specified finish.
- C. Colors - Inorganic iron oxide pigments, ASTM C 979.
- D. Water: Clean and potable.
- E. Admixtures:
  - 1. ASTM C260 for air-entraining admixtures.
  - 2. ASTM C494/C495M Types A - G for water reducing, retarding, accelerating and high range admixtures.
  - 3. Other admixtures: integral water repellents and other chemicals, for which no ASTM Standard exists: Previously established as suitable for use in concrete by proven field performance or through laboratory testing.
  - 4. ASTM C618 mineral admixtures: Do not use dark and variable colors in surfaces intended to be exposed to view.
  - 5. ASTM C989 granulated blast furnace slag may be used to improve physical properties. Tests are required to verify these features.
- F. Reinforcement:
  - 1. ASTM A615/A615M, Grade 40 or 60. Provide galvanized or epoxy coated bars when covered with less than 2 inches of material for bars larger than 5/8 inch and 1-1/2 inches for bars 5/8 inch or smaller.

2. Welded Wire Fabric: ASTM A185 where applicable for wet cast units; do not use in dry cast units.

### 2.3 ACCESSORIES

- A. Hydrated Lime: ASTM C207, Type 2.
- B. Quicklime: ASTM C5.
- C. Accessories:
  1. Hohmann & Barnard #444 Stainless Steel Stone Anchors.
  2. Anchors: Non-corrosive; stainless steel Type 304.

### 2.4 MIX

- A. Compressive Strength: 6,500 psi at 28 days.
- B. Color Pigment: Add to mixture in quantity to achieve selected color.
- C. Mortar: Type N, ASTM C 270.

### 2.5 FABRICATION

- A. General: Comply with ASTM C1364.
  1. Minimum Thickness: As shown on Drawings.
  2. Reinforce cast stone to sufficiently support its weight and resist damage from handling stresses.
  3. Shape:
    - a. Provide wash on exterior cast stone projecting pieces with exposed top surfaces.
    - b. Projecting Pieces: Provide drips under outer edge.
  4. Freeze/Thaw Durability: Cast Stone Institute Technical Bulletin No. 40 and ASTM C666, Modified Procedure A: Cumulative Percent Weight Loss (CPWL) less than 5 percent after 300 freeze/thaw cycles.
  5. Lift Loops and Erection Inserts: Locate so they will not be visible in completed construction. Provide minimum 1-1/2 inch concrete or grout cover over loops and inserts in completed construction. Recess and patch loops or inserts that will be exposed to public view with grout.
- B. Reinforce cast stone to sufficiently support its weight and resist damage from handling stresses.
- C. Reinforcing:
  1. Minimum reinforcing: 0.25 percent of cross section area.
  2. Reinforcement: Noncorrosive where faces exposed to weather are covered with less than 1-1/2 inch of concrete material. Place reinforcement with minimum coverage of twice the bar diameter.
  3. Reinforce soffits and similar stones greater than 24 inch in one direction in that direction. Units less than 24 inch in both length and width dimensions do not need to be reinforced unless otherwise specified.
  4. Do not use welded wire fabric reinforcing in dry cast products.
- D. Exposed Finish:
  1. Cast stone to produce finish to match accepted samples.
  2. Exposed to view surfaces shall have a fine-grained texture similar to natural stone, with no air voids in excess of 1/32 inch and density of such voids shall be less than 3 occurrences per any 1 square inch and not obvious under direct daylight illumination at 5 foot distance.
  3. Finish texture shall match approved sample when viewed under direct daylight illumination at a 10 foot distance.
    - a. ASTM D 2244 permissible variation in color between units of comparable age subjected to similar weathering exposure.
      - 1) Total color difference – not greater than 6 units.
      - 2) Total hue difference – not greater than 2 units.
- E. Curing: Controlled method of high pressure, steam, water spray, or vacuum.
  1. Maximum linear shrinkage after curing not to exceed 0.3 percent, ASTM C426.

- F. Tolerances: Dimension as indicated on Drawings. Fabricate and furnish to following tolerances:
1. Length or Width: Plus/minus 1/8 inch.
  2. Variation in Cross-sectional Dimension: Plus/minus 1/8 inch.
  3. End Deviation for Square or Designated Skew: Length divided by 360, 1/4 inch maximum.
  4. Bowing of Members: Length (in inches) divided by 360, 3/8 inch maximum.
  5. Warpage of Members: Length (in inches) divided by 360, 3/8 inch maximum.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Verify items provided by other Sections of work are properly sized and located.
- C. Examine bearing surfaces to ensure surfaces are at proper elevation and are free from dirt or other deleterious matter.

#### **3.2 PREPARATION**

- A. Establish lines, levels, and coursing; protect from disturbance.
- B. Provide temporary bracing during erection of masonry work. Maintain in place until building structure provides permanent support.
- C. Provide temporary supports under masonry support systems when necessary. Retain in place until mortar has attained adequate strength.
- D. Wetting Masonry: Wet units prior to cleaning. Wetting not required prior to setting units.

#### **3.3 INSTALLATION**

- A. Comply with Cast Stone Institute *Technical Manual*.
  1. Lift members by means of suitable lifting devices at points provided by fabricator.
  2. Drench stones with water prior to setting.
  3. Set cast stone accurately, true to line, and level on full-thick mortar bed and with full flushed joints.
  4. Set units on lead or neoprene pads.
  5. Fill dowel holes and anchor slots with mortar or non-shrink grout.
  6. Provide uniform bed horizontal joints and vertical joints match masonry veneer.
  7. Cast Stone Anchors: Provide anchors in slots and dowels in holes.
    - a. Provide additional anchors and dowels as recommended by manufacturer and installer to provide proper anchorage.
    - b. Fill dowel holes and anchors slots completely with mortar or non-shrink grout.
  8. Joints Under Relieving Angles: Unfilled for joint sealing under Section 079200.
  9. After each stone is mortar set, rake joints to depth of 3/4 inch from face for pointing.
  10. Clean faces of stone work of splashed mortar or mortar smears by sponging off.
  11. Pointing: Dampen joints and carefully tuck point to slight concave joint.
    - a. Pointing not allowed in freezing weather or in locations exposed to hot sun, unless properly protected.
  12. Sealant joints - Prime the ends of stones, insert properly sized foam backup rod and gun-in sealant.
- B. Banding: Comply with NCMA TEK 5-2A: Clay And Concrete Masonry Banding Details. Use two lengths of continuous wire reinforcing at veneer wythe, clipped to tie extending from wall back-up. Embed wire reinforcing fully in mortar. Space reinforcing at 16 inches oc maximum vertically.
  1. Vertical joints: Provide sealant joints.
  2. Coordinate with work of Section 042000.
- C. Tolerances: Remove work not conforming to specified tolerances and reconstruct to proper tolerances.
  1. Comply with Cast Stone Institute® *Technical Manual*.
  2. Set stones 1/8 inch or less, within the plane of adjacent units.
  3. Joints, plus – 1/16 inch; minus - 1/8 inch.



4. Variation from Plumb: 1/4 inch per story non-cumulative; 3/8 inch maximum in two stories or more.
5. Variation from Level Coursing: 3 mm in 1/8 inch in 3 feet; 6 mm in 1/4 inch in 10 feet; 1/2 inch maximum.
6. Variation from Unit to Adjacent Unit: 1/32 inch maximum.
7. Variation from Plan Location: 1/4 inch in 10 feet and 1 1/2 inch maximum in 20 feet or more.

D. Metal Through-wall Flashing:

1. Refer to Section 042000.
2. Locate under bands on shelf angles, lintels, and other locations indicated on Drawings.
3. Space seams 8 feet apart maximum.
4. Extend flashing 1/4 inch beyond outside face of both sides of wall and bend downward at 45 degree angle to create water drip.
5. Form end dams at terminations of lintels and other discontinuous horizontal runs. Where abutting adjacent vertical wall surfaces, extend flashing through control joint. Turn flashing in adjacent wall. Create end dams to provide positive drainage to exterior.

### 3.4 ADJUSTING AND CLEANING

- A. Altering or Patching in Field: Altering or patching of members in field will be allowed only after Architect's acceptance of methods and workmen to be used.
  1. Altering or Patching: By manufacturer.
  2. Patching: Comply with Cast Stone Institute Technical Bulletin No. 38 - Patching.
- B. Cleaning: Clean exposed surfaces as necessary to remove dirt and stains which may be on surfaces after erection. Clean cast stone units after installation procedures are completed. Comply with Cast Stone Institute Technical Bulletin No. 39 - Cleaning Procedures and cast stone manufacturer's recommendations.
  1. Remove mortar and weld stains from faces of cast stone units.
  2. Scrub faces with fiber brush (metal not allowed), using mild detergent and water. Thoroughly rinse with clean running water.
  3. Acids not allowed without specific acceptance.
  4. Prepared cleaners not allowed without specific written approval of cast stone manufacturer.
  5. Power washing or sandblasting not allowed without specific written approval of cast stone manufacturer.
  6. Protect plants, grasses, and other vegetation from damage due to cleaning materials and process. Thoroughly flush chemical cleaners with copious quantities of water to ensure that local fauna is not harmed due to ingesting runoff.

### 3.5 CLEANING AND REPAIR

- A. Clean stone by wetting with clear running water and applying a solution of "Sure Kleen #600" by ProSoCo Products, Inc. or equal. Follow manufacturer's instructions.
- B. Repair obvious chips with touchup material furnished by the manufacturer.

### 3.6 PROTECTION

- A. Protect stone while on ground (and after setting) from splashing, mortar and damage from other trades.

**END OF SECTION**



**SECTION 05 1200**  
**STRUCTURAL STEEL FRAMING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section Includes:

- 1. Structural steel.
- 2. Grout.

- B. Related Sections:

- 1. Division 01 Section "Quality Requirements" for independent testing agency procedures and administrative requirements.
- 2. Division 05 Section "Steel Decking" for field installation of shear connectors through deck.
- 3. Division 05 Section "Metal Fabrications" for steel lintels and shelf angles not attached to structural-steel frame, miscellaneous steel fabrications, and other metal items not defined as structural steel.

**1.3 DEFINITIONS**

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

**1.4 PERFORMANCE REQUIREMENTS**

- A. Connections: Provide details of simple shear connections required by the Contract Documents to be selected or completed by structural-steel fabricator, to withstand loads indicated and comply with other information and restrictions indicated.

**1.5 SUBMITTALS**

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  2. Include embedment drawings.
  3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
  4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts.
- C. Welding Procedure Specifications (WPSs) and Procedure Qualification Records (PQRs): Provide according to AWS D1.1/D1.1M, "Structural Welding Code - Steel," for each welded joint whether prequalified or qualified by testing, including the following:
1. Power source (constant current or constant voltage).
  2. Electrode manufacturer and trade name, for demand critical welds.
- D. Qualification Data: For qualified professional engineer.
- E. Welding certificates.
- F. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- G. Mill test reports for structural steel, including chemical and physical properties.
- H. Product Test Reports: For the following:
1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
  2. Shop primers.
  3. Non-shrink grout.
- I. Source quality-control reports.

## 1.6 QUALITY ASSURANCE

- A. Shop-Painting Applicators: Qualified according to SSPC-QP 3, "Standard Procedure for Evaluating Qualifications of Shop Painting Applicators."
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Comply with applicable provisions of the following specifications and documents:
1. AISC 303.
  2. AISC 341 and AISC 341s1.
  3. AISC 360.
  4. RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Pre-installation Conference: Conduct conference at Project site.

## 1.7 DELIVERY, STORAGE, AND HANDLING

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

## 1.8 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

## PART 2 - PRODUCTS

### 2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 572, Grade 50.
- B. Channels, Angles-Shapes: ASTM A 36.
- C. Plate and Bar: ASTM A 36.
- D. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.
- E. Steel Forgings: ASTM A 668/A 668M.
- F. Welding Electrodes: Comply with AWS requirements.

## 2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers; all with plain finish.
- B. High-Strength Bolts, Nuts, and Washers: ASTM A 490, Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; ASTM A 563, Grade DH, heavy-hex carbon-steel nuts; and ASTM F 436, Type 1, hardened carbon-steel washers with plain finish.
- C. Unheaded Anchor Rods: ASTM F 1554, Grade 36 .
  - 1. Configuration: Hooked.
  - 2. Nuts: ASTM A 563 heavy-hex carbon steel.
  - 3. Plate Washers: ASTM A 36 carbon steel.
  - 4. Washers: ASTM F 436, Type 1, hardened carbon steel.
  - 5. Finish: Plain.
- D. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
  - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
  - 2. Plate Washers: ASTM A 36 carbon steel.
  - 3. Washers: ASTM F 436, Type 1, hardened carbon steel.
  - 4. Finish: Plain.
- E. Threaded Rods: ASTM A 36.
  - 1. Nuts: ASTM A 563 heavy-hex carbon steel.
  - 2. Washers: ASTM A 36 carbon steel.
  - 3. Finish: Plain.

## 2.3 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, non-asphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.
- B. Galvanizing Repair Paint: ASTM A 780.

## 2.4 GROUT

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

## 2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
  - 1. Camber structural-steel members only where indicated.
  - 2. Fabricate beams with rolling camber up.
  - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
  - 4. Mark and match-mark materials for field assembly.
  - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
  - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
  - 2. Weld threaded nuts to framing and other specialty items indicated to receive other work.

## 2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

## 2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
  - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches.
  - 2. Surfaces to be field welded.
  - 3. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
  - 4. Galvanized surfaces.

- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
  - 1. SSPC-SP 2, "Hand Tool Cleaning."
  - 2. SSPC-SP 3, "Power Tool Cleaning."
- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils. Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  - 1. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

## 2.8 GALVANIZING

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

## 2.9 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
  - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
  - 1. Liquid Penetrant Inspection: ASTM E 165.
  - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  - 3. Ultrasonic Inspection: ASTM E 164.
  - 4. Radiographic Inspection: ASTM E 94.



## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base Bearing and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 3. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
  - 1. Level and plumb individual members of structure.
  - 2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.

- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection.
- G. Do not enlarge unfair holes in members by burning or using drift pins. Ream holes that must be enlarged to admit bolts.

### 3.4 FIELD CONNECTIONS

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

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be tested and inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
  - 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
    - a. Liquid Penetrant Inspection: ASTM E 165.
    - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
    - c. Ultrasonic Inspection: ASTM E 164.
    - d. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:

1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
  2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

### 3.6 REPAIRS AND PROTECTION

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

END OF SECTION 051200



**SECTION 05 2100**  
**STEEL JOIST FRAMING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. K-series steel joists.
  - 2. K-series steel joist substitutes.
  - 3. Joist accessories.
- B. Related Sections include the following:
  - 1. Division 04 Section "Unit Masonry" for installing bearing plates in unit masonry.

**1.3 DEFINITIONS**

- A. SJ "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."

**1.4 SUBMITTALS**

- A. Product Data: For each type of joist, accessory, and product indicated.
- B. Shop Drawings: Show layout, designation, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, joist accessories; splice and connection locations and details; and attachments to other construction.
  - 1. Indicate locations and details of bearing plates to be embedded in other construction.
- C. Welding certificates.
- D. Manufacturer Certificates: Signed by manufacturers certifying that joists comply with requirements.

- E. Mill Certificates: Signed by bolt manufacturers certifying that bolts comply with requirements.
- F. Field quality-control test and inspection reports.

## 1.5 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables of SJI "Specifications."
  - 1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements, as indicated in the drawings.
- B. SJI Specifications: Comply with standard specifications in SJI's "Specifications" that are applicable to types of joists indicated.
- C. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

## 1.7 SEQUENCING

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

# PART 2 - PRODUCTS

## 2.1 MATERIALS

- A. Steel Bearing Plates: ASTM A 36/A 36M.
- B. Carbon-Steel Bolts and Threaded Fasteners: ASTM A 307, Grade A, carbon-steel, hex-head bolts and threaded fasteners; carbon-steel nuts; and flat, unhardened steel washers.
  - 1. Finish: Plain.

- C. High-Strength Bolts, Nuts, and Washers: ASTM A 325, Type 1, heavy hex steel structural bolts; ASTM A 563 heavy hex carbon-steel nuts; and ASTM F 436 hardened carbon-steel washers.
  - 1. Finish: Plain.
- D. Welding Electrodes: Comply with AWS standards.
- E. Galvanizing Repair Paint: ASTM A 780.

## 2.2 PRIMERS

- A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

## 2.3 K-SERIES STEEL JOISTS

- A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
  - 1. Joist Type: K-series steel joists.
- B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.
- C. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- D. Provide holes in chord members for connecting and securing other construction to joists.
- E. Camber joists according to SJI's "Specifications."
- F. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

## 2.4 JOIST ACCESSORIES

- A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.
- B. Bridging: Schematically indicated. Detail and fabricate according to SJI's "Specifications." Furnish additional erection bridging if required for stability.

- C. Fabricate steel bearing plates with integral anchorages of sizes and thicknesses indicated. Shop prime paint.
- D. Steel bearing plates with integral anchorages are specified in Division 05 Section "Metal Fabrications."
- E. Supply ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction, as required. Extend ends to within 1/2 inch of finished wall surface, unless otherwise indicated.
- F. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

## 2.5 CLEANING AND SHOP PAINTING

- A. Clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.
- B. Do not prime paint joists and accessories to receive sprayed fire-resistive materials. Coordinate with architectural drawings for locations of joists to receive sprayed fire-resistive materials.
- C. Apply 1 coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.
- D. Shop priming of joists and joist accessories is specified in Division 09.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
  - 1. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
  - 1. Before installation, splice joists delivered to Project site in more than one piece.



2. Space, adjust, and align joists accurately in location before permanently fastening.
  3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
  4. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads have been applied.
- C. Field weld joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Bolt joists to supporting steel framework using high-strength structural bolts. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
- E. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

### 3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and bolted connections and to perform field tests and inspections and prepare test and inspection reports.
- B. Field welds will be visually inspected according to AWS D1.1/D1.1M.
- C. In addition to visual inspection, field welds will be tested according to AWS D1.1/D1.1M and the following procedures, as applicable:
1. Radiographic Testing: ASTM E 94.
  2. Magnetic Particle Inspection: ASTM E 709.
  3. Ultrasonic Testing: ASTM E 164.
  4. Liquid Penetrant Inspection: ASTM E 165.
- D. Bolted connections will be visually inspected.
- E. High-strength, field-bolted connections will be tested and verified according to procedures in RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts."
- F. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.
- G. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

### 3.4 REPAIRS AND PROTECTION

- A. Repair damaged galvanized coatings on galvanized items with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel, and accessories.
  - 1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
  - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION 052100

**SECTION 05 3100****STEEL DECKING****PART 1 - GENERAL****1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the following:
  - 1. Roof deck.
- B. Related Sections include the following:
  - 1. Division 03 Section "Cast-in-Place Concrete" for concrete fill.
  - 2. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.

**1.3 SUBMITTALS**

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction. Shop drawings are to include section properties of each type of deck being used.
- C. Product Certificates: For each type of steel deck, signed by product manufacturer.
- D. Welding certificates.
- E. Field quality-control test and inspection reports.
- F. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:

#### 1.4 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.
- B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. Fire-Test-Response Characteristics: Where indicated, provide steel deck units identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Fire-Resistance Ratings: Indicated by design designations of applicable testing and inspecting agency.
  - 2. Steel deck units shall be identified with appropriate markings of applicable testing and inspecting agency.
- D. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- E. FMG Listing: Provide steel roof deck evaluated by FMG and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

#### 1.6 COORDINATION

- A. Coordinate installation of sound-absorbing insulation strips in ribs of acoustical deck with roofing installation specified in Division 07 Section to ensure protection of insulation strips against damage from effects of weather and other causes.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

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

- a. Canam Steel Corp.;The Canam Manac Group.
- b. New Millennium Building Systems, LLC.
- c. Nucor Corp.; Vulcraft Division.
- d. United Steel Deck, Inc.
- e. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.

## 2.2 ROOF DECK

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
  1. Galvanized Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade G60 zinc coating.
  2. Deck Profile: As indicated
  3. Profile Depth: As indicated
  4. Design Uncoated-Steel Thickness: As indicated
  5. Design Uncoated-Steel Thicknesses; Deck Unit: As indicated
  6. Span Condition: Triple span or more.
  7. Side Laps: Overlapped.

## 2.3 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- G. Piercing Hanger Tabs: Piercing steel sheet hanger attachment devices for use with floor deck.
- H. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, thickness to match gage of deck, with factory-punched hole of 3/8-inch minimum diameter.

- I. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch thick, of same material and finish as deck, with 3-inch- wide flanges and sloped recessed pans of 1-1/2-inch minimum depth. For drains, cut holes in the field.
- J. Galvanizing Repair Paint: ASTM A 780.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine supporting frame and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance.

### 3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.
- I. Mechanical fasteners may be used in lieu of welding to fasten deck. Locate mechanical fasteners and install according to deck manufacturer's written instructions.

### 3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
  - 1. Weld Diameter: As indicated.
  - 2. Weld Spacing: Weld edge and interior ribs of deck units as indicated.
  - 3. Weld Washers: Install weld washers at each weld location, as required by manufacturer.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at noted.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
  - 1. End Joints: Lapped 2 inches minimum.
- D. Roof Sump Pans: Install over openings provided in roof deck and mechanically fasten flanges to top of deck. Space mechanical fasteners not more than 12 inches apart with at least one fastener at each corner.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Mechanically fasten to substrate to provide a complete deck installation.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

### 3.4 FIELD QUALITY CONTROL

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

### 3.5 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces of deck with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 053100



**SECTION 05 4000**  
**COLD-FORMED METAL FRAMING**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. This Section includes the following:
1. All cold formed metal framing identified in the structural drawings.
  2. Ceiling joist framing.
- B. Related Sections include the following:
1. Division 05 Section "Metal Fabrications" for masonry shelf angles and connections.
  2. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
  3. Division 09 Section "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

**1.3 PERFORMANCE REQUIREMENTS**

- A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
1. Design Loads: As indicated.
  2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
    - a. Exterior Load-Bearing Framing: Horizontal deflection as noted.
    - b. Ceiling Joist Framing: Vertical deflection as noted.
  3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F.
  4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:

- a. Upward and downward movement of L/360.
- B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
  - 1. Design exterior load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of cold-formed metal framing product and accessory indicated.
- B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
  - 1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation. Both erection plans and calculations are to be stamped and signed by a professional engineer licensed to practice in the State of Maryland.
- C. Welding certificates.
- D. Qualification Data: For professional engineer.
- E. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
  - 1. Steel sheet.
  - 2. Expansion anchors.
  - 3. Power-actuated anchors.
  - 4. Mechanical fasteners.
  - 5. Vertical deflection clips.
  - 6. Horizontal drift deflection clips
  - 7. Miscellaneous structural clips and accessories.

#### 1.5 QUALITY ASSURANCE

- A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in the State of Maryland and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for

installations of cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.

- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.
- D. Product Tests: Mill certificates or data from a qualified independent testing agency, indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, and metallic-coating thickness.
- E. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."
- F. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- G. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
  - 1. Comply with AISI's "Standard for Cold-Formed Steel Framing – Header Design."

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Clark Steel Framing.
  - 2. Dale/Incor.
  - 3. Dietrich Metal Framing; a Worthington Industries Company.
  - 4. MarinoWare; a division of Ware Industries.
  - 5. United Metal Products, Inc.

## 2.2 MATERIALS

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
  - 1. Grade: As required by structural performance.
  - 2. Coating: G60 or equivalent.

## 2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 20 gage (33 mils) minimum, and as required by design.
  - 2. Flange Width: 1-5/8" minimum, and as required by design.
  - 3. Section Properties: As required by design.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, un-punched, with un-stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 20 gage (33 mils), and as required by design.
  - 2. Flange Width: 1-1/4" minimum, and as required by design.

## 2.4 CEILING JOIST FRAMING

- A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, un-punched, and as follows:
  - 1. Minimum Base-Metal Thickness: 20 gage (33 mils), and as required by design.
  - 2. Flange Width: 1-5/8" minimum, and as required by design.
  - 3. Section Properties: As required by design.

## 2.5 FRAMING ACCESSORIES

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

8. Stud kickers, knee braces, and girts.
9. Joist hangers and end closures.
10. Hole reinforcing plates.
11. Backer plates.

## 2.6 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- C. Mechanical Fasteners: ASTM C 1513, corrosion-resistant-coated, self-drilling, self-tapping steel drill screws.
  1. Head Type: Low-profile head beneath sheathing, manufacturer's standard elsewhere.
- D. Welding Electrodes: Comply with AWS standards.

## 2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A 780.

## 2.8 FABRICATION

- A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
  1. Fabricate framing assemblies using jigs or templates.
  2. Cut framing members by sawing or shearing; do not torch cut.
  3. Fasten cold-formed metal framing members by welding or screw fastening, standard with fabricator. Wire tying and clinch fastening of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
  4. Fasten other materials to cold-formed metal framing by welding, or screw fastening, according to Shop Drawings.

- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
  - 1. Spacing: Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.
  - 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

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

#### 3.2 PREPARATION

- A. Before sprayed fire-resistive materials are applied, attach continuous angles, supplementary framing, or tracks to structural members indicated to receive sprayed fire-resistive materials.
- B. After applying sprayed fire-resistive materials, remove only as much of these materials as needed to complete installation of cold-formed framing without reducing thickness of fire-resistive materials below that are required to obtain fire-resistance rating indicated. Protect remaining fire-resistive materials from damage.

#### 3.3 INSTALLATION, GENERAL

- A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.

1. Screw or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch.
- D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
  1. Cut framing members by sawing or shearing; do not torch cut.
  2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- H. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet and as follows:
  1. Space individual framing members no more than plus or minus 1/8 inch from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

### 3.4 EXTERIOR NON-LOAD-BEARING WALL INSTALLATION

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

1. Stud Spacing: 16" o.c. maximum at brick veneer, and 24" o.c. maximum at all other locations, as required by design.
- C. Set studs plumb, except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.
- D. Install horizontal bridging in wall studs, spaced in rows indicated on Shop Drawings but not more than 48 inches apart, and as required by design . Fasten at each stud intersection.
  1. Bridging: Cold-rolled steel channel, welded or mechanically fastened to webs of punched studs. Or steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
- E. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

### 3.5 FIELD QUALITY CONTROL

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

### 3.6 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 054000

n



**SECTION 055000**  
**METAL FABRICATIONS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Rough hardware.
  - 2. Shelf angles.
  - 3. Angle Frames and edge angles.
  - 4. Pipe bollards.
  - 5. Steel lintels.
  - 6. Countertop framing and supports.
  - 7. Radio Antenna Bracket Supports.
- B. Related Sections:
  - 1. Section 099600 – High Performance Coatings.
- C. This Project is a registered US Green Building Council “LEED” project.
  - 1. Select materials to maximize use of recycled steel.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit product data for manufactured components indicating type, finish, size, accessories, and anchorage details.
- C. Shop Drawings:
  - 1. Indicate profiles, dimensions, fabrication and installation details, size and type of fasteners, welds, accessory items, shop finish and method of anchorage.
  - 2. Stamp shop drawings with seal and signature of professional engineer responsible for design.
- D. Submit following Informational Submittals: Certifications specified in Quality Assurance article.
- E. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
    - a. Metal Fabrications
  - 2. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
    - a. Metal Fabrications

**1.3 QUALITY ASSURANCE**

- A. Certifications: Fabricator's statement indicating fabrications are designed, fabricated, and installed to comply with code and Contract Document loading.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Comply with provisions of Section 016000.

**PART 2 - PRODUCTS****2.1 FERROUS METALS, GENERAL**

- A. Steel Plates, Shapes and Bars: ASTM A36.
  - 1. Steel: Maximize use of recycled steel with minimum of 30 percent.
- B. Steel Bar Grating: ASTM A36.

- C. Steel Tubing:
  - 1. Cold-formed, ASTM A500
  - 2. Hot-rolled, ASTM A501.
- D. Structural Steel Sheet:
  - 1. Hot-rolled, ASTM A1011/A1011M.
  - 2. Cold-rolled ASTM A1008/A1008M.
  - 3. Class 1; of grade required for design loading.
- E. Galvanized Structural Steel Sheet: ASTM A653, of grade required for design loading. Coating designation; G90.
- F. Steel Pipe: ASTM A53; type and grade (if applicable) as selected by fabricator and as required for design loading; black finish unless otherwise indicated.
- G. Gray Iron Castings: ASTM A48, Class 30.
- H. Malleable Iron Castings: ASTM A47, grade as selected by fabricator.
- I. Brackets, Flanges and Anchors: Cast or formed metal of the same type material and finish as supported rails, unless otherwise indicated.
- J. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.

## **2.2 GROUT**

- A. Non-Shrink Grout:
  - 1. Pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives.
  - 2. Minimum strength at 28 days: 5000 psi.
  - 3. Comply with ASTM C1107.
  - 4. Acceptable Products:
    - a. Crystex, L&M Construction Chemicals, Omaha, NE.
    - b. Masterflow 713, Master Builders, Cleveland, OH.
    - c. Euco Rock Anchor Bolt Grout, Euclid Chemical Co., Cleveland, OH.
    - d. SikaGrout 212, Sika Corporation, Lyndhurst, NJ.
    - e. Five Star Grout, Five Star Products, Fairfield, CT.

## **2.3 FASTENERS**

- A. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
  - 1. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
  - 2. Eyebolts: ASTM A 489.
  - 3. Machine Screws: ASME B18.6.3.
  - 4. Lag Bolts: ASME B18.2.1.
  - 5. Wood Screws: Flat head, ASME B18.6.1.
  - 6. Plain Washers: Round, ASME B18.22.1.
  - 7. Lock Washers: Helical, spring type, ASME B18.21.1.
  - 8. Masonry Anchorage Devices: Expansion shields.
  - 9. Toggle Bolts: Tumble-wing type, class and style as required.

## **2.4 SURFACE PREPARATION AND APPLICATION**

- A. Steel surfaces to be primed must be dry and free of dirt, oils, rust, salt and other contaminants.
- B. Blast-clean steel to "commercial grade" SSPC SP-6 for general use.
- C. Galvanized Steel: Remove soluble and insoluble contaminants and corrosion. Sweep (Abrasive) Blasting per ASTM D6386 to achieve a uniform anchor profile (1.0 - 2.0 mils).
- D. Apply primers in accordance with manufacturer's instructions.

**2.5 UNIVERSAL PRIMER**

- A. Manufacturer's standard, lead free primer, capable of providing sound foundation for field applied top coats despite prolonged exposure.
- B. Standard: FS TT-P-645.
- C. Maximum Allowable Dry Time: 4 hours to touch; 24 hours to re-coat.
- D. Compatible with finish paint system specified in 099000.
- E. Acceptable Products:
  - 1. Series 88HS Tnemec Company, Inc., Kansas City, MO.
  - 2. Carboguard 890 VOC, Carboline Company, St. Louis, MO.
  - 3. Corlar LV-PR, Dupont.

**2.6 ZINC-RICH PRIMER**

- A. Inorganic, zinc-rich, capable of providing sound foundation for field applied top coats despite prolonged exposure, cathodic protection and corrosion resistance. Similar to galvanizing.
  - 1. Pigment Content: Minimum 63% zinc in dry film by weight.
  - 2. Compatible with finish paint system specified in 099000.
  - 3. Acceptable Products:
    - a. Tnemec H90-97 Tneme-Zinc, Tnemec Co., Kansas City, MO.
    - b. Carbo-Zinc 859 VOC, Carboline Company, St. Louis, MO.
    - c. ZRC Cold Galvanizing Compound, ZRC Products Company, Quincy, MA.

**2.7 GALVANIZING**

- A. Provide hot-dip galvanized coating in accordance with:
  - 1. ASTM A153 - Iron and Steel Hardware.
  - 2. ASTM A123 - Rolled, pressed and forged steel shapes, plates, bars and strips 1/8 inch thick and heavier.
- B. Galvanizing Repair Paint:
  - 1. Standard: MIL-P-21035 or SSPC-Paint-20.
  - 2. Acceptable Products:
    - a. Tnemec 90-97 Tneme-Zinc, Tnemec Company, Inc., Kansas, MO.
    - b. Carbo-Zinc 859 VOC, Carboline Company, St. Louis, MO.
    - c. ZRC Cold Galvanizing Compound, ZRC Products Company, Quincy, MA.

**2.8 FABRICATION, GENERAL**

- A. Field verify dimensions prior to shop fabrication.
- B. Minimize joints and seams by using largest stock sizes practical.
- C. Locate multiple joints at regular intervals and at least conspicuous locations.
- D. Form flush, tight, hairline joints and seams. Continuously weld joints and seams to develop the full strength of the jointed members.
- E. Miter exposed joints. Grind exposed welds, seams and joints to form a smooth, uniform surface.
- F. Weld in accord with AWS D1.1 for materials being welded.
- G. Ease exposed edges to a minimum, uniform radius of 1/32 inch.
- H. Fit and shop assemble sections in largest sizes practical for site delivery.
- I. Fabricate work to exclude rain and condensate or provide weep holes to divert water to the exterior.
- J. Form break metal corners to the smallest radius possible without distressing the finish surface.
- K. Cut, drill, punch, tap, reinforce and provide anchors to accommodate adjoining work and hardware.
- L. Provide anchors, bolts, rough hardware, fasteners and accessories required to incorporate and secure fabrications and to make the units functionally operational.
- M. Use countersunk, flat head screws and bolts at exposed joints requiring mechanical fasteners.

- N. At exposed work, use materials which are smooth, free of surface blemishes, pitting, seam marks, roller marks, trade names and roughness.

## **2.9 ROUGH HARDWARE**

- A. Furnish bent or custom fabricated bolts, plates, anchors, hangers, dowels and miscellaneous steel and iron shapes required for framing, supporting, anchoring or securing fixtures, accessories, and furnishings.
- B. Straight bolts and other stock rough hardware items are specified in Division 6 sections.
- C. Fabricate items to sizes, shapes and dimensions required.
- D. Furnish steel washers, except use malleable-iron washers for heads and nuts which bear on wood structural connections.
- E. Finish: Same as item being supported or anchored.

## **2.10 SHELF ANGLES**

- A. Provide steel shelf angles of sizes indicated for attachment to building framing.
- B. Miter Outside and Inside Corners. Do not weld joints.
- C. Finish: Galvanized.

## **2.11 OVERHEAD DOOR AND EQUIPMENT SUPPORTS**

- A. Provide weld plates, anchor plates, anchor bolts, angle iron clips, and related items required by overhead coiling door manufacturer for installation of overhead doors equipment.
  - 1. Fabricate in accordance with dimensions indicated and requirements of overhead door manufacturer.
  - 2. Provide angle iron, steel channels, steel tube end support posts, guide support framing and equipment framing.
  - 3. Fabricate and anchor members to structure to meet requirements and loads of overhead door manufacturer.

## **2.12 ANGLE FRAMES AND EDGE ANGLES**

- A. Lateral Supports for Storefronts:
  - 1. Structural steel angles, sized for spans and wind loads, to support storefronts to structures.
  - 2. Securely fasten angles to storefront and structure.
- B. Lateral Supports for Masonry Partitions:
  - 1. 4 x 4 x 1/4 inch angles by 6 inches long fastened to underside of structure to provide lateral support for full-height masonry partitions.
  - 2. Place angle at each side of partition on 48 inch centers on each side of partition.
- C. Vanities and Countertops: Provide framing to support countertops.
- D. Complete with anchors and bolts. For casting in concrete, space anchors 24 inches OC with 1-1/4 inches by 1/4 inch by 8 inches steel straps.
- E. Finish: Universal primer.

## **2.13 PIPE BOLLARDS**

- A. Posts: Galvanized steel pipe ASTM F1083, round, six inch diameter. Schedule 80.
- B. Post Fill: Class "A" Portland cement concrete
- C. Cap top of bollard with an acorn cap.
- D. Painted Finish: Field paint with High Performance Coating. Color to be selected by Architect. Refer to Section 099600.

## **2.14 STEEL LINTELS**

- A. Provide at wall openings and recesses.
- B. Weld multiple loose lintels to form a single unit.
- C. Provide a minimum of 8 inches of bearing at ends unless noted otherwise.

- D. Finish: Galvanized and high performance coating finish, per Section 099600.

## **2.15 FRAMING AND SUPPORTS**

- A. Provide framing to support countertops.
- B. Finish: Universal primer.

## **2.16 ANTENNA BRACKET SUPPORTS**

- A. Provide galvanized framing and pipe to support Owner supplied antenna.
- B. Refer to Drawing Detail A5/A-122.
- C. Finish: High performance coating specified in Section 099600.

# **PART 3 - EXECUTION**

## **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Coordinate and furnish setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, concrete inserts, sleeves, anchor bolts and miscellaneous items having integral anchors which are embedded in concrete or masonry construction.

## **3.2 INSTALLATION, GENERAL**

- A. Perform cutting, drilling and fitting required for installation of fabrications.
- B. Set work accurately to established lines and levels.
- C. Provide temporary bracing and anchors for items which are to be built into concrete, masonry or similar construction.
- D. Fit exposed connections together to form tight hairline joints. Weld connections which are left as exposed joints.
- E. Grind exposed joints smooth and touch-up shop paint.
- F. Do not weld, cut or abrade galvanized surfaces of bolted or screwed connections.
- G. Field Welding; comply with AWS Code D1.1.
- H. Clean concrete and masonry bearing surfaces of any bond-reducing materials; roughen to improve bond to surfaces. Clean bottom surface of bearing plates.
- I. Set loose leveling and bearing plates on wedges, or adjustable devices. After the bearing members have been positioned and plumbed, tighten the anchor bolts. Do not remove wedges or shims, but if protruding, cut flush with edge of bearing plate before packing with grout.
- J. Pack grout between bearing surfaces and plates; ensure no voids remain.

## **3.3 BOLLARDS**

- A. Fill bollards solidly with concrete and allow to set prior to installation.
- B. Anchor in concrete with pipe sleeves preset and anchored into concrete.
- C. After bollards have been inserted into sleeves, fill annular space between bollard and sleeve solidly with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's written instructions.
- D. Slope grout up approximately 1/8 inch toward bollard.

## **3.4 ADJUST AND CLEAN**

- A. Touch-Up Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas and paint with same material used for shop painting. Apply by brush or spray to provide a minimum dry film thickness of 2.0 mils.
- B. For Galvanized Surfaces: Clean field welds, bolted connections and abraded areas and apply galvanizing repair paint complying with ASTM A780.

**END OF SECTION**



**SECTION 055100****METAL STAIRS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Metal Pan Stairs.
- B. Related Sections:
  - 1. Section 055200 - Metal Railings.
  - 2. Section 099000 - Paints and Coatings.
- C. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select materials to maximize use of recycled steel.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 SYSTEM REQUIREMENTS**

- A. Design Requirements:
  - 1. Fabricator is responsible for designing system including necessary modifications to meet specified requirements and maintain visual design concepts.
  - 2. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of stair system.
  - 3. In addition to requirements shown or specified, comply with NAAMM Metal Stairs Manual for design, materials, fabrication, and installation.
  - 4. Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
  - 5. Make modifications only to meet field conditions and ensure fitting of components.
  - 6. Obtain Architect's approval of modifications and for connections to building elements at locations other than indicated on Drawings.
  - 7. Provide concealed fastening wherever possible.
  - 8. Attachment Considerations: Account for site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening and fracturing connection between units and building structure or between components themselves.
- B. Structural Requirements:
  - 1. Live Load on Stairs and Platforms: 100 psf at treads and platforms and 300 pounds on area of 4 square inches at center of tread.
  - 2. Maximum Allowable Deflection: L/360
- C. Interface With Adjacent Systems: Coordinate with handrails and railings specified in Section 055200

**1.3 SUBMITTALS**

- A. General: Submit following items under provisions of Section 013300
- B. Product Data: Submit product data for primer.
- C. Shop Drawings:
  - 1. Indicate profiles, dimensions, connection attachments, reinforcing, anchorage, openings, size and type of fasteners, and accessories.
  - 2. Stamp shop drawings with seal and signature of professional engineer responsible for design.
- D. Submit following Informational Submittals:
  - 1. Support reactions design data.
  - 2. Certifications specified in Quality Assurance article.
  - 3. Qualification data: Engineer's, fabricator's, and welders qualification data.
- E. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:

1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
  - a. Metal Stairs
2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
  - a. Metal Stairs.
3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
  - a. Metal Stairs

#### **1.4 QUALITY ASSURANCE**

- A. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering in jurisdiction where Project is located, with minimum of 5 years experience in design of metal stair systems.
- B. Fabricator Qualifications: Company specializing in fabricating work specified in this Section with minimum 5 years documented experience.
- C. Certifications:
  1. Submit certificates verifying AWS qualifications for each welder employed on Project.
  2. Submit fabricator's certification that products furnished for Project meet or exceed specified requirements.
  3. Engineering certifications.
  4. Certification that fabrication and installation comply with structural requirements listed this Section.

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

- A. Comply with provisions of Section 016000.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

- A. Steel: Maximize use of recycled steel with minimum of 30 percent.
- B. Steel Section: ASTM A36.
- C. Steel Tubing: 1-1/4 inches N.P.S. ASTM A53, Grade B, Schedule 40, or as required for design loading.
- D. Steel Sheet: ASTM A1011/A1011MG90, (galvanized) or ASTM A1008/A1008M; grade as required for design loading.
- E. Fasteners:
  1. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
  2. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
  3. Eyebolts: ASTM A 489.
  4. Machine Screws: ASME B18.6.3.
  5. Lag Bolts: ASME B18.2.1.
  6. Wood Screws: Flat head, ASME B18.6.1.
  7. Plain Washers: Round, ASME B18.22.1.
  8. Lock Washers: Helical, spring type, ASME B18.21.1.
  9. Masonry Anchorage Devices: Expansion shields.
  10. Toggle Bolts: Tumble-wing type, class and style as required.
- F. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.

#### **2.2 STAIR NOSINGS**

- A. Manufacturers:



1. Wooster Products, Inc.
  2. Balco, Inc.
  3. American Safety Tread Company.
  4. Barry Pattern and Foundry Company, Inc.
  5. Safe-T-Metal Company, Inc.
- B. Description: Extruded units with aluminum oxide abrasive aggregate strips.
- C. Extruded Stair Nosings:
1. Interior Locations: Extruded-aluminum units, corrosion resistant for every tread and landing.
- D. Size: 2 inch by 1/4 inch thick.
- E. Fabrication: Provide manufacturer's standard integral anchors for embedding units in concrete.
1. Stair Nosing Lengths: One piece, stair width between railings minus 4 inches.
  2. Concrete Pan Construction: Apply black asphaltic coating to concealed bottoms, sides, and edges.

### **2.3 SURFACE PREPARATION AND APPLICATION**

- A. Steel surfaces to be primed must be dry and free of dirt, oils, rust, salt and other contaminants.
- B. Blast-clean steel to "commercial grade" SSPC SP-6 for general use.
- C. Apply primers in accordance with manufacturer's instructions.

### **2.4 UNIVERSAL PRIMER**

- A. Manufacturer's standard, lead free primer, capable of providing sound foundation for field applied top coats despite prolonged exposure.
- B. Standard: FS TT-P-645.
- C. Maximum Allowable Dry Time: 4 hours to touch; 24 hours to re-coat.
- D. Compatible with finish paint system specified in 099000.
- E. Acceptable Products:
  1. Series 88HS, Tnemec Company, Inc., Kansas City, MO.
  2. Carboguard 890 VOC, Carboline Company, St. Louis, MO.
  3. Corlar LV-PR, Dupont.

### **2.5 FABRICATION**

- A. Verify dimensions on site prior to shop fabrication.
- B. Join pieces together by welding.
- C. Provide complete stair assemblies, including metal framing, hangers, columns, struts, clips, brackets and bearing plates.
- D. Bolt or weld headers to stringers and framing members to stringers and headers; fabricate so that bolts, if used, do not appear on finish surfaces.
- E. Fabricate joints and seams to be as strong and rigid as adjoining sections. Joints to be close fitting and where least conspicuous.
- F. Grind exposed welds flush and smooth.
- G. Close exposed ends of stringers.
- H. Provide clip angles for fastening of furring channels, where an applied finish is indicated for soffits.
- I. Where masonry walls support steel stairs, provide temporary supporting struts designed for erection of steel stair components before installation of masonry.
- J. Metal Pan Risers, Subtreads, and Subplatforms: Shape metal pans for risers and subtreads to conform to configuration shown. Provide thicknesses of structural steel sheet for metal pans indicated but not less than that required to support total design loading.
  1. Form metal pans of hot-rolled or cold-rolled carbon steel sheet, unless otherwise indicated.
  2. Attach risers and subtreads to stringers by means of brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding.

3. Provide subplatforms of configuration and construction indicated, or if not indicated, of same metal as risers and subtreads and in thicknesses required to support design loading. Attach subplatform to platform framing members with welds.

## **2.6 FINISHES**

- A. Interior Stairs: Universal primer.
- B. Provide final painting under Section 099000.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300

### **3.2 PREPARATION**

- A. Coordinate setting drawings, diagrams, templates and directions for installation of inserts and anchors, anchor bolts and miscellaneous items having integral anchors embedded in masonry.
- B. Coordinate and furnish inserts and anchors set in masonry for installation of work.
- C. Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly of units. Disassemble units only as necessary for shipping and handling. Mark units for re-assembly and coordinated installation.

### **3.3 INSTALLATION**

- A. Provide anchorage devices, fasteners, hangers or struts where necessary for securing items to in-place construction; including threaded fasteners for concrete inserts, toggle bolts, through-bolts and connectors.
- B. Cut, drill and fit as required for installation of work. Set work in location, alignment and elevation, plumb and level, true and free of rack. Install per approved shop drawings.
- C. Fit exposed connections to form tight hairline joints. Field-weld connections which cannot be shop-welded. Grind joints smooth and touch up shop primer coat.
- D. Leave metal stairs ready to receive finish, where applicable, per Section 099000 - Paints and Coatings.
- E. Fill metal pans with concrete specified in Section 033000. Install abrasive nosing in accordance with manufacturer's written instructions.

### **3.4 CLEANING**

- A. Immediately after erection, clean field welds, bolted connections and damaged shop coat, and re-coat.

**END OF SECTION**

**SECTION 055133****LADDERS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes: Steel ladders for roof access.
- B. Related Sections:
  - 1. Section 099000 - Paints and Coatings.
- C. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select materials to maximize use of recycled steel.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 SYSTEM REQUIREMENTS**

- A. Design Requirements: Fabricator is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
- B. Structural Requirements: Ladders: In addition to requirements shown and specified, comply with applicable provisions of ANSI A14.3 for design, materials, fabrication, and installation of component parts.

**1.3 SUBMITTALS**

- A. General: Submit following items under provisions of Section 013300.
- B. Product Data: Submit product data for primer paint.
- C. Shop Drawings: Submit shop drawings showing dimensions, fabrication and installation details. Indicate size and type of fasteners, welds, accessory items, shop finish and method of anchorage.
- D. Submit following Informational Submittals:
  - 1. Certifications specified in Quality Assurance article.
  - 2. Qualification Data: Fabricator's and welder's qualification data.
- E. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
    - a. Metal Ladders
  - 2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post -consumer recycled content of metal materials based on material cost per weight for the following materials:
    - a. Metal Ladders.
  - 3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
    - a. Metal Ladders

**1.4 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Company specializing in fabricating work specified in this Section with minimum 5 years documented experience.
- B. Welder Qualifications: AWS certified within past 12 months for each type of weld required.
- C. Certifications:
  - 1. Submit certificates verifying AWS qualifications for each welder employed on Project.
  - 2. Submit fabricator's certification that products furnished for Project meet or exceed specified requirements.
  - 3. Engineering Certifications.
  - 4. Furnish certification that code required design loadings have been complied with in the design and fabrication of the work.

**1.5 DELIVERY, STORAGE AND HANDLING**

- A. Comply with provisions of Section 016000.

**PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Steel Section: ASTM A36.
1. Steel: Maximize use of recycled steel with minimum of 30 percent.
- B. Steel Sheet: ASTM A653, G90, (galvanized) or ASTM A611, grade as required for design loading.
- C. Fasteners:
1. General: Provide zinc-coated fasteners for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
  2. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
  3. Eyebolts: ASTM A489.
  4. Machine Screws: ASME B18.6.3.
  5. Lag Bolts: ASME B18.2.1.
  6. Wood Screws: Flat head, ASME B18.6.1.
  7. Plain Washers: Round, ASME B18.22.1.
  8. Lock Washers: Helical, spring type, ASME B18.21.1.
  9. Masonry Anchorage Devices: Expansion shields.
  10. Toggle Bolts: Tumble-wing type, class and style as required.
- D. Concrete Inserts: Threaded or wedge type; galvanized ferrous castings, either malleable iron, ASTM A47, or cast steel, ASTM A27. Provide bolts, washers and shims as required, hot-dip galvanized, ASTM A153.

**2.2 VERTICAL LADDERS**

- A. Type: Vertical steel ladders consisting of the following components:
1. Side Rails: 3/8 inch by 2-1/2 inches flat steel bars with eased edges.
    - a. Side-Step Ladders and Ladders with Top Terminating at Hatch: Space side rails 18 inches apart.
    - b. Through Ladders (Step through ladder at top termination): Space side rails 24 inches apart.
  2. Rungs: 3/4 inch minimum round steel bars spaced 12 inches maximum on center, punched through the stringers and plug welded.
  3. Provide non-slip surface on top of each rung, either by coating the rung with aluminum oxide granules set in epoxy resin adhesive, or by using manufactured rung filled with aluminum oxide grout.
  4. Angle Supports: Support ladders by steel angles bolted to walls and floors to provide minimum of 7 inches from face of wall to centerline of rungs. Locate at 5 feet on center and within 16 inches of top and bottom.
  5. Safety Handrails: Extend rails 48 inches above top rung and anchor to structure, if adjacent structure does not extend above top rung, gooseneck extended rails back to structure.

**2.3 FABRICATION PROCEDURES**

- A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Verify measurements in field for work fabricated to fit Project conditions. Before starting work, examine adjoining work on which work of this section is in any way dependent for workmanship and fit.
- C. Fabricate finish surfaces smooth, unless otherwise specified.
- D. Cut, punch, drill and tap for attachment of work coming in contact with ladder where indicated or where directions for same are given prior to or with approval of shop drawings.

- E. Make joints as strong and rigid as adjoining sections. Make exposed joints close fitting and where jointing is least conspicuous. Unless otherwise indicated or specified, full weld joints and seams and dress smooth where exposed.
- F. Connections and Accessories: Weights of connections and accessories shall meet design loads.

## **2.4 SURFACE PREPARATION AND APPLICATION**

- A. Steel surfaces to be primed must be dry and free of dirt, oils, rust, salt and other contaminants.
- B. Blast-clean steel to "commercial grade" SSPC SP-6 for general use.
- C. Apply primers in accordance with manufacturer's instructions.

## **2.5 UNIVERSAL PRIMER**

- A. Manufacturer's standard, lead and chromate free primer, capable of providing sound foundation for field applied top coats despite prolonged exposure.
- B. Maximum Allowable Dry Time: 4 hours to touch; 24 hours to re-coat.
- C. Compatible with finish paint system specified in 099000.
- D. Acceptable Products:
  - 1. Series 88HS, Tnemec Company, Inc., Kansas City, MO.
  - 2. Carboguard 890 VOC, Carboline Company, St. Louis, MO.

## **2.6 GALVANIZING**

- A. Provide hot-dip galvanized coating in accordance with:
  - 1. ASTM A153 - Iron and Steel Hardware.
  - 2. ASTM A123 - Rolled, pressed and forged steel shapes, plates, bars and strips 1/8 inch thick and heavier.
- B. Galvanizing Repair Paint:
  - 1. Standard: SSPC-Paint-20.
  - 2. Acceptable Products:
    - a. Tnemec H90-97 Tneme-Zinc, Tnemec Co., Kansas City, MO.
    - b. Carbo-Zinc 859 VOC, Carboline Company, St. Louis, MO.
    - c. ZRC Cold Galvanizing Compound, ZRC Products Company, Quincy, MA.

## **2.7 FINISHES**

- A. Interior Ladders: Universal primer.
- B. Final painting under Section 099000 - Paints and Coatings.

# **PART 3 - EXECUTION**

## **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.

## **3.2 INSTALLATION**

- A. Set items in position, align and brace securely until permanent anchorage is made.
- B. Install supporting members, fastenings, framing, hangers, bracing brackets, straps, bolts and angles required to set and connect work to structure.
- C. Provide suitable anchors.
- D. Upon completion of installations, re-examine work and provide additional shims, washers, anchors and corrective work to ensure that installation is firm, tight, anchored, in alignment with neat fits, without distortion, unsightly fastenings, raw edges or protrusions.

## **3.3 PROTECTION**

- A. Protect finished installation under provisions of Section 017300.

**END OF SECTION**



**SECTION 055200  
METAL RAILINGS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Round steel pipe and tube handrails and guardrails.
- B. Related Sections:
  - 1. Section 051200 - Structural Steel Framing.
  - 2. Section 055100 - Metal Stairs.
  - 3. Section 099000 - Painting and Coatings.
- C. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select materials to maximize use of recycled steel.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 DEFINITIONS**

- A. Guardrail: A system of building components located near the open sides of elevated walking surfaces for the purpose of minimizing the possibility of an accidental fall from the walking surface to the lower level.
- B. Handrail: A horizontal or sloping rail grasped by hand for guidance or support, and for the purpose of minimizing the possibility of accidental falls on the adjacent walking surface.

**1.3 SYSTEM REQUIREMENTS**

- A. Design Requirements:
  - 1. Fabricator is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
  - 2. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of handrail and railing system.
  - 3. In addition to requirements shown or specified, comply with NAAMM Pipe Railing Manual for design, materials, fabrication, and installation.
  - 4. Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
  - 5. Provide concealed fastening wherever possible.
  - 6. Make modifications only to meet field conditions and to ensure fitting of components.
  - 7. Obtain Architect's approval of modifications.
- B. Structural Requirements:
  - 1. Handrails and Guards: Capable of withstanding following loads applied as indicated.
    - a. Concentrated load of 200 pounds applied at any point along the top, in any direction, and have attachment devices and supporting structure to transfer this loading to appropriate structural elements of the building.
    - b. Uniform load of 50 PLF applied in any direction at the top and to transfer this load through the supports to the structure.
    - c. Concentrated and uniform loads above need not be applied simultaneously.
  - 2. Infill Area of Guardrail System: Intermediate rails (all those except the handrail), balusters, and panel fillers shall withstand horizontal load of 50 pounds on area equal to 1 square foot, including openings and space between rails. Above load need not be assumed to be acting concurrently with horizontal loads on railing system.
- C. Interface with Adjacent Systems:
  - 1. Integrate design and connections with adjacent construction.
  - 2. Accommodate allowable tolerances and deflections for structural members in installation.

**1.4 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit product data for primer, grout, anchorage devices, and connection devices.
- C. Shop Drawings:
  - 1. Stamp shop drawings with seal and signature of professional engineer responsible for design.
  - 2. Submit shop drawings showing dimensions, materials, fabrication and installation details.
  - 3. Indicate size and type of fasteners, welds, accessory items, shop finish and method of anchorage.
  - 4. Indicate material type and grades.
- D. Samples: Submit material samples and finished products as requested by Architect.
- E. Submit following Informational Submittals:
  - 1. Support reactions design data.
  - 2. Certifications specified in Quality Assurance article.
  - 3. Qualification Data: Engineer's, fabricator's, and welder's qualification data.
  - 4. Manufacturer's instructions.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
    - a. Metal Railings
  - 2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
    - a. Metal Fabrications.
  - 3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
    - a. Metal Railings

**1.5 QUALITY ASSURANCE**

- A. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering in jurisdiction where Project is located, with minimum of 5 years experience in design of metal handrail and railing systems.
- B. Welder Qualifications: AWS certified within past 12 months for each type of weld required.
- C. Regulatory Requirements: Comply with Authorities Having Jurisdiction and Americans with Disabilities Act (ADA) including ADA Accessibility Guidelines to accommodate barrier free design.
- D. Certifications:
  - 1. Submit certificates verifying AWS qualifications for each welder employed on Project.
  - 2. Submit fabricator's certification that products furnished for Project meet or exceed specified requirements.
  - 3. Engineering certifications.

**1.6 DELIVERY, STORAGE AND HANDLING**

- A. Comply with requirements of Section 016000.

**PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Steel: Maximize use of recycled steel with minimum of 30 percent.
- B. Railing System:
  - 1. Round Pipe:
    - a. ASTM A53, Type S - seamless, Grade B, standard weight class, unless noted otherwise.
    - b. Finish: Black at interior; galvanized at exterior.



2. Round Structural Tubing:
  - a. ASTM A500, seamless, Grade A.
  - b. Finish: Standard at interior; Hot-dip galvanized in accordance with ASTM A53, 1.8 oz/square feet coating thickness.
3. Vertical Pickets:
  - a. ASTM A6 bar stock.
  - b. Size as indicated on Drawings.
  - c. Finish to match railing.
- C. Railing System Anchor Sleeves and Inserts:
  1. Structural Plate and Bars: ASTM A36/A36M.
  2. Headed Stud Anchors: ASTM A108, grades 1010 through 1020, AWS D1.1, Section 7, Grade B, forged steel, headed, uncoated.
  3. Pipe Sleeves:
    - a. ASTM A53 with steel plate welded to bottom, black finish.
    - b. Size to provide 1/8 inch minimum space between inside of sleeve and outside of railing post after allowance for placement and erection tolerances. Minimum length of 5 inches and minimum diameter of 1 inch larger than maximum post dimension.
    - c. Provide temporary closure on top of sleeve to prevent concrete and moisture penetration.
- D. Railing Accessories:
  1. Fittings: Fabricate tees, elbows, splice connections, wall returns, wall ends, rail caps, post caps, and accessories from same material and finish as railing.
  2. Mounting Flanges and Anchor Plates:
    - a. Fabricate of same material and finish as railing.
    - b. Provide holes for anchorage to adjacent construction.
  3. Handrail Brackets:
    - a. Steel wall mount bracket fabricated of same material as railing.
    - b. Same finish as railing.
    - c. Similar to Wagner RB14025, but with projection to meet ADA required clearance of 1-1/2 inch clearance between inside of handrail and wall.
- E. Fasteners:
  1. Bolts and Nuts: Regular hexagon head type, ASTM A307, Grade A.
  2. Eyebolts: ASTM A489.
  3. Machine Screws: ASME B18.6.3.
  4. Lag Bolts: ASME B18.2.1.
  5. Wood Screws: Flat head, ASME B18.6.1.
  6. Plain Washers: Round, ASME B18.22.1.
  7. Lock Washers: Helical, spring type, ASME B18.21.1.
  8. Masonry Anchorage Devices: Expansion shields.
  9. Toggle Bolts: Tumble-wing type, class and style as required.
  10. Concrete Expansion Anchors:
    - a. 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 equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
    - b. Finish: Zinc-plated.
  11. Finish: Provide hot-dip zinc coating in accordance with ASTM A153 for anchors in exterior use.
- F. Non-Shrink Grout:
  1. Premixed and packaged non-ferrous aggregate, non-staining, shrinkage-resistant, non-corrosive, non-gaseous complying with ASTM C1107, 5000 psi minimum compressive strength.
  2. Acceptable Products and Manufacturers:
    - a. Crystex, L&M Construction Chemicals, Omaha, NE.
    - b. Masterflow 713, Master Builders, Cleveland, OH.
    - c. Euco Rock Anchor Bolt Grout, Euclid Chemical Co., Cleveland, OH.

- d. SikaGrout 212, Sika Corporation, Lyndhurst, NJ.
- e. Five Star Grout, Five Star Products, Fairfield, CT.

G. Provide templates for locating components.

## 2.2 FABRICATION

A. General:

- 1. Verify dimensions on site prior to shop fabrication.
- 2. Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling. Clearly mark units for reassembly and coordinated installation.

B. Design Requirements:

- 1. Return railings to walls at ends.
- 2. Extend railings 12 inches beyond top riser and 12 inches beyond plus 1 tread beyond bottom riser where not continuous.
- 3. Make clear distance between components of guardrail infill such that 4 inch diameter sphere cannot pass through opening.
- 4. Grind welded joints and surfaces smooth, with no sharp or abrasive corner edges or surfaces.

C. Railing Components:

- 1. Use prefabricated fittings for joining railing components.
- 2. Use prefabricated radius bends or bend pipe to form radius bends free from buckles or twist, with smooth finished surfaces.
- 3. Fabricate joints exposed to weather to exclude water or provide weep holes.
- 4. Remove burrs from exposed cut edges.
- 5. Close exposed ends of pipe and tube with cap or end fitting.
- 6. Fabricate toe boards or kick plate of 4 inches wide by 1/4 inch steel plate unless noted otherwise.
- 7. Provide self-closing, unlatched, hinged gates where necessary in stairwell to direct traffic toward main exit and to prevent egress traffic from going to basement. Fabricate gate in same configuration as railing, complete with springs, hinges, and stops.

D. Connection of Railing Components:

- 1. Use internal welding connector sleeves.
- 2. Completely weld joints, without undercutting or overlap.
- 3. Remove slag, grind exposed welds smooth and contour surface to match adjacent surfaces.
- 4. Bolted or riveted connections are not acceptable.

## 2.3 FINISHES

A. General:

- 1. Apply primers in accordance with manufacturer's instructions.
- 2. Steel surfaces to be primed must be dry and free of dirt, oils, rust, salt and other contaminants.

B. Surface Preparation:

- 1. Interior Uncoated Surfaces: Remove mill scale, rust and dirt by SSPC-SP3 power tool cleaning
- 2. Galvanized Steel: Remove soluble and insoluble contaminants and corrosion. Sweep (Abrasive) Blasting per ASTM D6386 to achieve a uniform anchor profile (1.0 - 2.0 mils).

C. Finish Types:

- 1. Universal Primer:
  - a. Manufacturer's standard, lead free primer, capable of providing sound foundation for field applied top coats despite prolonged exposure.
  - b. Standard: FS TT-P-645.
  - c. Compatible with finish paint system specified in 099000.
  - d. Acceptable Products:
    - 1) Series 88HS, Tnemec Company, Inc., Kansas City, MO.
    - 2) Carboguard 890 VOC, Carboline Company, St. Louis, MO.

- 3) Corlar LV-PR, Dupont.
2. Galvanizing Repair Paint:
  - a. Standard: MIL-P-21035 or SSPC-Paint-20.
  - b. Acceptable Products:
    - 1) Tnemec H90-97 Tneme-Zinc, Tnemec Co., Kansas City, MO.
    - 2) Carbo-Zinc 859 VOC, Carboline Company, St. Louis, MO.
    - 3) ZRC Cold Galvanizing Compound, ZRC Products Company, Quincy, MA.
3. Final painting under Section 099000 - Painting and Coating.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify installation tolerances of items embedded in other work:
  1. Spacing: Plus or minus 3/8 inch.
  2. Alignment: Plus or minus 1/4 inch.
  3. Plumbness: Plus or minus 1/8 inch.

#### **3.2 PREPARATION**

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages, embedded sleeves, concrete inserts, and anchor bolts.
- B. Clean sleeves of debris.

#### **3.3 INSTALLATION**

- A. Install in accordance with Section 017300 and approved shop drawings.
- B. Fit exposed connections accurately to form tight, hairline joints. Make joints as strong and rigid as adjoining construction. Fully weld joints and seams and dress smooth where exposed.
- C. Set posts plumb and align to within 1/4 inch in 12 feet. Set rails horizontal or parallel to rake of steps or ramp to within 1/4 inch in 12 feet.
- D. Anchoring Posts:
  1. Anchor posts in preset sleeves anchored in concrete. Fill annular space between posts and sleeves solid with non-shrink non-metallic grout. Wipe off excess grout and leave 1/8 inch build-up sloped away from post.
  2. Anchor posts by welding to imbedded plates preset and anchored in concrete.
  3. Anchor posts with floor flange or fascia flange and fascia brackets to concrete with concrete expansion anchors and to steel by bolting or field welding.
- E. Attach Wall Rails:
  1. Install with 1-1/2 inches clearance from inside face of handrail to finished wall surface.
  2. Concrete and Solid Masonry: Expansion anchors; expansion shields and concealed hanger bolts, or exposed lag bolt.
  3. Hollow Masonry: Toggle bolts
  4. Stud Partitions: Secure to metal grounds with toggle bolt; wood blocking with lag bolt.
  5. Provide wall handrails brackets spaced maximum of 6 feet on center.
- F. Expansion Joints:
  1. Provide slip joint with internal sleeve extending 2 inches beyond joint on each side.
  2. Fasten sleeve to one side only.
  3. Locate expansion joints within 6 inches of post.
  4. Provide at intervals of maximum 40 feet centers for railings exceeding 60 feet.

#### **3.4 CLEANING**

- A. Touch-Up Painting:
  1. Perform immediately after erection.
  2. Clean field welds of flux.
  3. Power-tool clean abraded shop paint.
  4. Paint exposed areas with shop primer.

- 5. Clean field welds and abraded areas of galvanized surfaces and apply galvanizing repair paint per ASTM A780.

- B. Final Painting: Furnished under Section 099000.

**3.5 PROTECTION**

- A. Protect railings under provisions of Section 017300.

**END OF SECTION**

**SECTION 061053**  
**MISCELLANEOUS ROUGH CARPENTRY**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Wood blocking within building and on roof; panel equipment boards; pergola rafters, blocking, and bracing.
  - 2. Temporary floor system in Apparatus Bay.
- B. Products Specified But Not Installed Under This Section:
  - 1. Section 031000 - Concrete Forms and Accessories: Attachment of anchor plates [grounds] to formwork.
  - 2. Section 033000 - Cast-In-Place Concrete: Placement of anchor bolts.
  - 3. Section 042000 - Unit Masonry: Placement of anchor bolts.
- C. This project is a registered US Green Building Council "LEED" project.
  - 1. Wood framing and blocking shall be certified according to the guidelines of the Forest Stewardship Council.
  - 2. Use of "certified wood" means use of minimum of 50 percent of wood-based materials certified in accordance with the Forest Stewardship Council (FSC) Guidelines for wood building components, including but not limited to structural framing and general dimensional framing, flooring, sub-flooring, wood doors and finishes.
  - 3. Sealants and Adhesives used within building shall comply with VOC limits of South Coast Air Quality Management District (SCAQMD) requirements.
  - 4. Provide composite wood and agri-fiber products without added urea-formaldehyde resins complying with LEED Formaldehyde Limits requirements.
  - 5. Select locally or regionally fabricated products (within 500 miles of jobsite) wherever possible.
  - 6. Select VOC compliant treatment for wood used on building interiors.

**1.2 DEFINITIONS**

- A. Blocking: Wood used for plates, furring, shimming, stripping, sleepers, grounds, curbing, cants, bracing, nailers, grounds for finish carpentry, and filling in between framing members.
- B. Pressure Treatment: Pressure impregnation with preservative and fire-retardant chemicals.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Provide product data on wood treatment materials; include historical performance information.
- C. Samples:
  - 1. Exposed To View Lumber (Pergola): Submit 24 inch long sections indicating wood grain and finish.
- D. Submit following Informational Submittals:
  - 1. Certifications specified in Quality Assurance article.
  - 2. Manufacturer's instructions for wood treatment materials.
- E. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Rough Carpentry
  - 2. LEED Credit MRc7: Provide documentation certifying the percentage of wood based products harvested from a FSC forest.
    - a. Wood

- b. Provide wood certification submittal documentation including chain-of-custody documentation for all wood based materials installed.
  - c. Provide a spreadsheet of all wood based products used on the project highlighting certified wood based material and include calculations demonstrating that 50% of wood based materials are certified wood.
  - d. Composite wood and agri-fiber products must contain no added urea-formaldehyde resins.
- 3. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
  - a. Adhesives and sealants.
- 4. LEED Credit EQc4.2: Provide VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
  - a. Applied wood treatment chemicals used on wood on building interior.
- 5. LEED Credit EQc4.4: Composite wood, plywood, and agri-fiber products shall contain no added urea-formaldehyde resins

#### **1.4 QUALITY ASSURANCE**

- A. Grade Marks:
  - 1. Identify lumber and plywood by official grade mark.
  - 2. Lumber: Include symbol of grading agency, mill name, grade, species, grading rules, and condition of seasoning at time of manufacturer.
  - 3. Plywood: Include type, class identification index, and agency mark.
  - 4. Pressure treatment: Include quality mark of grading agency which maintains continued supervision, testing, inspection, and re-examination service over product quality as described in AWPA standards.
  - 5. Fire-retardant treated wood: Imprint each piece with mark attesting to FR-S rating.
- B. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

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

- A. Comply with requirements of Section 016000.
- B. Storage and Protection:
  - 1. Store products above ground, on platforms or skids, and covered with waterproof coverings.
  - 2. Store products with ventilation, drainage, and protection against damp or wet locations.
  - 3. Support products to prevent warping and distortion.
- C. Fire-Retardant Treated Wood:
  - 1. Keep materials dry during delivery and storage.
  - 2. Protect against exposure to weather.

### **PART 2 - PRODUCTS**

#### **2.1 SOLID SAWN LUMBER**

- A. General: Provide from an FSC certified source.
- B. Lumber Grading Agency: Certified by American Lumber Standards Committee or NLGA.
- C. Grading rules of NLGA, SPIB, WCLIB, and WWPA apply to respective materials furnished.
- D. Comply with PS-20.
- E. Dimensions: Lumber dimensions are nominal; actual dimensions conform to PS-20 and applicable rules writing agencies.
- F. Maximum moisture content at time of dressing: 19 percent.
- G. Surfacing: Surface four sides (S4S), unless noted otherwise.

- H. Finger-jointed lumber is not permitted.
- I. Size Classification: 2 inches to 4 inches thick, 2 inches to 4 inches wide.
- J. General Non-Structural Framing: Stud grade, any species except as otherwise noted.
  - 1. Pergola: Southern pine, treated.
- K. Blocking: Utility grade, any species.

## **2.2 PLYWOOD**

- A. General: Provide composite wood and agri-fiber products without added urea-formaldehyde resins complying with LEED - Formaldehyde Limits requirements.
- B. Grading Rules:
  - 1. PS-1 or APA PRP-108.
  - 2. Plywood Grading Agency: Certified by APA.
  - 3. Species Groups: 1 through 4, as required for span rating.
- C. Uses, Grades, and Ratings:
  - 1. Equipment Panel Boards:
    - a. Rated Sheathing.
    - b. Exposure 1.
    - c. Grade: C-D.
    - d. Thickness: 23/32 inches minimum.
  - 2. Temporary Floor:
    - a. Rated Sheathing.
    - b. Exposure 1.
    - c. Grade: A-C.
    - d. Thickness: 23/32 inches minimum.

## **2.3 FRAMING ACCESSORIES**

- A. Acceptable Manufacturers:
  - 1. Simpson Strong-Tie Company, Pleasanton, CA.
  - 2. United Steel Products Company, Inc. (Kant Sag), Montgomery, MN.
- B. Sheet Steel: ASTM A446, Grade A,
- C. Finish:
  - 1. Galvanized.
  - 2. Coating Thickness: ASTM A653, G60.

## **2.4 FASTENERS**

- A. Provide fasteners in sizes, spacings, and locations to suit applications.
- B. Provide hot-dipped galvanized or stainless steel fasteners for use with preservative treated and fire-retardant treated wood and for exterior use or where built into exterior walls. Select fasteners for the type, grade and class required.
- C. Anchors:
  - 1. Toggle bolt type for anchorage to hollow masonry.
  - 2. Expansion shield and lag bolt type for anchorage to solid masonry or concrete.
  - 3. Bolts or ballistic fasteners for anchorage to steel.
- D. Bolts: ASTM A307 with nuts and washers.
- E. Anchor Bolts: ASTM A307 with nuts and washers.
- F. Lag Screws and Lag Bolts: ANSI B18.2.1 with washers.
- G. Wood Screws: ANSI B18.6.1.
- H. Nails, Staples, and Spikes: FS FF-N-105.

## **2.5 ACCESSORIES**

- A. Adhesive:
  - 1. APA AFG-01.
  - 2. Waterproof, air cured type, cartridge dispensed.

3. VOC Limits: 30 g/l maximum for wood substrates.
- B. Adhesives & Sealants: Use adhesives and sealants that comply with VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
  1. Current requirement refers to the date on which the materials are installed in the building.
  2. A copy of SCAQMD Rule #1168 is referenced in Section 018113 that was current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
  3. Interior refers to all building construction that is inside of the exterior weatherproofing material.

## 2.6 WOOD TREATMENTS

- A. Kiln dry pressure-treated products after treatment to following maximum moisture contents:
  1. Lumber: 19-percent.
  2. Plywood: 15-percent.
- B. Preservative Pressure Treatment:
  1. Comply with AWPA U1; Use Category UC2 for interior construction not in contact with ground, Use Category UC3b for exterior construction not in contact with ground, and Use Category UC4a for items in contact with ground.
  2. Use of chromated copper arsenate (CCA) not allowed.
  3. Provide preservative treatment acceptable to authorities having jurisdiction and containing no arsenic or chromium.
  4. Do not incise surfaces of lumber at exposed to view locations.
  5. Treat following Items for Above Ground Use:
    - a. Grounds in contact with concrete.
    - b. Floor screeds.
    - c. Sills, plates, soles, and furring which rest on concrete exterior walls and masonry exterior walls, and are less than 8 inches from exposed earth.
    - d. Sills, plates, soles, furring, blocking, and sleepers on concrete slabs and masonry slabs which are in direct contact with the earth.
    - e. Wood used with roofing, flashing, and waterproofing.
    - f. Roof curbs, cants, and nailers for flashing.
    - g. Pergola rafters, blocking, and bracing.
- C. Preservative Cut Surface Treatment Applied at Site:
  1. Description:
    - a. Comply with AWPA M4.
    - b. Compatible with preservative pressure treatment.
    - c. Pigment: Colored.
- D. Fire Retardant Pressure Treatment: In accordance with the IBC, label to include the following:
  1. Identification mark of an approved agency:
    - a. Identification of the manufacturer
    - b. Name of the treatment
    - c. Species of wood
    - d. Flame spread and smoke developed index
    - e. Method of drying
    - f. If classified as EXTERIOR the words "No increase in the listed classification when subjected to the Standard Rain Test (ASTM D2898)".
  2. Strength Adjustments, Interior Fire Retardant Treated Wood:
    - a. Plywood: Test in accordance with ASTM D5516 and develop adjustment factors, maximum loads and spans or both using ASTM D6305.
    - b. Lumber: Test in accordance with ASTM D5664 and develop design value adjustments using ASTM D6841.
  3. Exposure to Weather, damp or wet locations
  4. Interior Applications: Interior fire retardant treated lumber and plywood shall have moisture content of not over 28 percent when tested in accordance with ASTM D3201 at 92 percent relative humidity.



5. Moisture Content: Fire retardant treated wood shall be dried after treatment to moisture content of 19% for lumber and 15% for plywood.
6. Third Party Inspection.
7. Additional Characteristics:
  - a. Chemically treat and pressure impregnate wood products.
  - b. Capable of providing a maximum flame spread/smoke development rating of 25/25 (FR-S Rating).
  - c. Not required to have brush treatment of cuts made in the field.
  - d. Not capable of bleeding through or adversely affecting type of finish indicated.
  - e. Not capable of corroding metals when tested in accordance with MIL-L-19140E.
8. Treated following Wood Items with Interior Type A Treatment:
  - a. Blocking above ceilings.
  - b. Blocking within return air plenums.
  - c. Blocking within walls.
  - d. Equipment panelboards.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Site Verification of Conditions:
  1. Verify end supports are ready to receive framing.
  2. Before installation, check members for damage, and proper dimensions.

#### **3.2 PREPARATION**

- A. Wood Treatment Applied to Cut Surfaces at Site:
  1. Comply with AWWPA M4.
  2. Apply preservative treatment in accordance with manufacturer's instructions to:
    - a. Preservative pressure treated wood site-sawn ends.
    - b. Holes cut through preservative pressure treated wood.
  3. Allow preservative to cure prior to erecting members.

#### **3.3 CONSTRUCTION**

- A. General:
  1. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction".
  2. Construct plumb, level, true to line, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.
  3. Securely attach rough carpentry work to substrate by anchoring and fastening, complying with the following:
    - a. Table 2304.9.1 Fastening Schedule in ICC's International Building Code (IBC).
    - b. ICC-ES evaluation report for fasteners.
  4. Comply with APA E30 requirements for plywood.
  5. Place horizontal and sloped members with crown edge up.
  6. Place vertical members with crown edge facing in same direction.
  7. Discard Material:
    - a. With defects which might impair quality of work.
    - b. Which are too small to fabricate work with minimum joints or optimum joint arrangement.
  8. Scribe, cope, and construct members accurately cut and fitted.
  9. Make tight connections between members to develop full member strength.
  10. Locate members as indicated. Do not change size, spacing, or spans without Architect's specific approval. Take care to place species and grades of members where indicated.
  11. Do not splice framing members between support points.
  12. Cut, notch, or bore members for passage of pipes and conduits in accordance with AFPA WCD. Reinforce members by use of formed sheet metal accessories.

13. Fasteners:
    - a. Use washers under bolt heads and nuts.
    - b. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials.
    - c. Install fasteners without splitting wood; predrill as necessary.
  14. Shimming:
    - a. Concrete and masonry bearing: Use steel or slate shims.
    - b. Metal and wood bearing: Do not use shims.
  15. Fire Retardant Treated Wood:
    - a. Do not rip cut.
    - b. Do not mill.
    - c. Only end cuts and bored holes are permitted.
  16. Preservative Treated Wood: Separate from metal decking with continuous flexible flashing.
- B. Wood Blocking:
1. Construct using maximum practical lengths.
  2. Provide and locate continuous blocking to facilitate installation and attachment of wall mounted equipment, cabinets, millwork, finishing materials, fixtures, specialty items, and trim.
  3. Cut and form to shapes for true line and level of work to be attached.
  4. Coordinate location with other work involved.
  5. Secure to masonry with metal plugs, toggle bolts, or expansion bolts set in masonry.
  6. Attach to substrates to support applied loading.
  7. Countersink bolts and nuts flush with wood surfaces.
  8. Plywood Backing and Mounting Boards:
    - a. Install for equipment where indicated.
    - b. Oversize panel by 12 inches beyond equipment perimeter.
  9. Size as necessary unless specific size is indicated.
- C. Wood Sleepers for Temporary Floor:
1. Provide 1 x 4 (3/4 by 3-1/2 inch) pressure treated sleepers for temporary floor.
  2. Install sleepers on 16 inch centers.
  3. Do NOT mechanically attach sleepers to Apparatus Bay floor.
- D. Plywood:
1. General:
    - a. Install panels with joints between panels staggered over center of supports.
    - b. Install over two or more supports.
    - c. Install with end joints staggered.
    - d. Install with panel joints not more than 1/8 inch wide.
  2. Plywood Backing and Mounting Boards:
    - a. Install for equipment where indicated.
    - b. Oversize panel by 12 inches beyond equipment perimeter.
  3. Plywood Flooring:
    - a. Install over sleepers.
    - b. Fasten with 1-1/4 inch countersunk screws.
    - c. Fasten on 6 inch centers at perimeter and 12 inch centers in field of panel.

### 3.4 TOLERANCES

- A. Lumber Framing Members: 1/4 inch maximum from true position.

### 3.5 PROTECTION

- A. Protect finished work in accordance with Section 017300.
- B. Protect products from moisture absorption and subsequent warping or deterioration until subsequent construction can proceed.

### END OF SECTION

**SECTION 061643  
GYPSUM SHEATHING**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Exterior wall sheathing.
  - 2. Sheathing joint and penetration treatment.
  - 3. Weather resistive barrier.
- B. Related Sections:
  - 1. Section 042000 – Unit Masonry.
  - 2. Section 054100 – Structural Metal Stud Framing.
  - 3. Section 072700 – Air Barriers: Flexible Flashing.
  - 4. Section 074243 – Composite Wall Panels.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Provide for exterior sheathing; include historical performance information.

**1.3 QUALITY ASSURANCE**

- A. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Comply with Section 016000.
  - 1. Storage and Protection:
    - a. Store products above ground, on platforms or skids, and covered with waterproof coverings.
    - b. Store products with ventilation, drainage, and protection against damp or wet locations.

**PART 2 - PRODUCTS****2.1 GLASS FIBER FACED GYPSUM SHEATHING**

- A. Glass Fiber Faced Gypsum Sheathing:
  - 1. Locations: Exterior walls of metal framing.
  - 2. Glass Fiber Faced Gypsum Sheathing, ASTM C1177.
  - 3. Thickness: 5/8 inch.
  - 4. Type X for fire-rated assemblies and locations where indicated; regular type at other assemblies.
  - 5. Flame spread and smoke developed, when tested in accordance with ASTM E84: 0.
- B. Acceptable Products and Manufacturers:
  - 1. G-P Dens-Glass Gold Exterior Sheathing, Georgia-Pacific Corporation, Atlanta, GA.
  - 2. e<sup>2</sup>XP Extended Exposure Sheathing, National Gypsum, Charlotte, NC.
  - 3. Securock Glass-Mat Sheathing, USG, Chicago, IL.

**2.2 ACCESSORIES**

- A. Sealant at Glass Fiber Faced Gypsum Sheathing: Silicone—General Purpose (Designation S-GP): ASTM C920, Type S, Grade NS:
  - 1. Class: 50. Joint movement range without cohesive/adhesive failure: Plus 50 percent to minus 50 percent of joint width.
  - 2. Uses: NT, M, G, A, O
  - 3. Low modulus, single component, neutral curing, non-staining, non-bleeding silicone sealant.
  - 4. Color: Manufacturer standard.

5. Acceptable Products:
  - a. 795, Dow Corning.
  - b. Silpruf, General Electric, Waterford, NY.
  - c. Rhodorsil 5C, Rhone-Poulenc, Inc. Monmouth Junction, NJ.
- B. Fasteners: Steel drill screws, in length recommended by sheathing manufacturer for thickness of sheathing board to be attached, with organic-polymer or other corrosion-protective coating having a saltspray resistance of more than 800 hours according to ASTM B117.
- C. Fluid Applied Air Barrier: Refer to Section 072700.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
  1. Verify sheathing ends will be supported on framing.
  2. Before installation, check members for damage, and proper dimensions.

#### **3.2 INSTALLATION**

- A. General: Construct plumb, level, true to line, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.
  1. Provide compatible sealant system between sheathing and adjacent construction.
  2. Seal locations necessary to create and secure continuous enclosure even though Drawings may not indicate all locations; do not seal weep holes.
  3. Seal to prevent migration of water, vapor, and air through joints within sheathing and between sheathing and adjacent construction.
- B. Glass Fiber Faced Gypsum Sheathing: Erect with edge butted tight and ends occurring over framing member. Space framing members at not more than 16 inches on center.
  1. Secure to steel framing with bugle head steel screws to each support in accordance with manufacturer's recommendations but with fasteners spaced at not more than 8 inches on center vertically.
  2. Apply continuous bead of silicone sealant at joints and terminations; trowel flat to establish water tight condition.

#### **3.3 PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. Protect products from moisture absorption and subsequent warping or deterioration until subsequent construction can proceed.

**END OF SECTION**

**SECTION 064100**  
**WOOD CABINETS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Related Sections:
  - 1. Section 123663 - Solid Surfacing Countertops.
  - 2. Section 123664 – Engineered Stone Countertops: Quartz.
- B. This project is a registered US Green Building Council “LEED” project.
  - 1. Select materials to maximize use of recycled materials.
  - 2. Select locally or regionally fabricated products wherever possible.
  - 3. Select adhesives and sealants meeting LEED requirements.
  - 4. Wood cabinetry, framing, and blocking shall be certified according to the guidelines of the Forest Stewardship Council.
  - 5. Use of “certified wood” means use of minimum of 50 percent of wood-based materials certified in accordance with the Forest Stewardship Council (FSC) Guidelines for wood building components, including but not limited to framing materials, wood blocking, curbs, cants, nailers, furring, grounds, pedestrian barriers, concrete formwork, and equipment backing boards.
  - 6. Select core board materials to maximize use of rapidly renewable materials.
  - 7. Provide composite wood and agri-fiber products without added urea-formaldehyde resins complying with LEED Formaldehyde Limits requirements.

**1.2 DEFINITIONS**

- A. Comply with applicable provisions of *Architectural Woodwork Standards (AWS)*, 2<sup>nd</sup> Edition, October 2014, as adopted and published by Architectural Woodwork Institute and the Woodwork Institute.
- B. Exposed: As used in this Specification Section, "exposed" portions of casework include surfaces visible when doors and drawers are closed. Bottoms of casework more than 4'-0" above finish floor are considered exposed. Visible surfaces in open casework or behind clear doors also are considered as exposed.
- C. Semi-Exposed: As used in this Specification Section, "semi-exposed" portions of casework include those members behind opaque doors, such as shelves, divisions, interior faces of ends, case backs, drawer sides, backs and bottoms, and back face of doors. Tops of cases 6'-6" or more above finish floor shall be considered semi-exposed.

**1.3 REFERENCES**

- A. General:
  - 1. The following documents form part of the Specifications to the extent stated. Where differences exist between codes and standards, the one affording the greatest protection shall apply.
  - 2. Unless otherwise noted, the referenced standard edition is the current one at the time of commencement of the Work.
  - 3. Refer to Division 01 Section "General Requirements" for the list of applicable regulatory requirements.
- B. WI – The Woodwork Institute: Quality Standards.
- C. ANSI/BHMA A156.9 - Cabinet Hardware.
- D. FS MM-L-736 - Lumber, Hardwood.
- E. FS MMM-A-130 - Adhesive, Contact.
- F. National Electric Manufacturers Association (NEMA) LD3 - High Pressure Decorative Laminates.
- G. PS 1 - Construction and Industrial Plywood.
- H. PS 20 - American Softwood Lumber Standard.

**1.4 PERFORMANCE REQUIREMENTS**

- A. Wall mounted cabinets: Able to withstand minimum cabinet-to-wall connection load of not less than 60 pounds per linear foot.

**1.5 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Manufacturers specifications and installation instructions for hardware and accessory items.
- C. Shop Drawings:
  - 1. Indicate elevations, profiles, sections, and views of casework fabrications at scale large enough to permit checking for design conformity (typically 3/4 inch = 1 foot for full sections, and 3 inch = 1 foot for details).
  - 2. Show sizes, thicknesses, quantities, markings, materials, finishes, accessories, hardware, and locations of each item.
  - 3. Include assembly and installation drawings to show methods of wood blocking, fastening, bracing, jointing, and connecting to work of other trades.
  - 4. Indicate dimensions necessary for fitting casework and adjacent equipment and appliances to fixed planes.
  - 5. Indicate cut-out locations.
  - 6. Accessory listings, Manufacturer's product number and location.
  - 7. Coordinate mechanical and electrical devices and other items occurring in casework.
  - 8. Indicate materials & schedule of finishes.
  - 9. Indicate grain direction.
- D. Samples:
  - 1. Stained Wood Millwork: three (3) 5"x8" size samples illustrating cabinet finish.
  - 2. Hardware: One (1) set samples of drawer and door pulls and hinges, drawer and shelf slides, shelf standards and clips illustrating hardware finish.
- E. Informational Submittals:
  - 1. Certifications specified in Quality Assurance article.
  - 2. Qualification Data: Fabricator's qualification data.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Rapidly renewable products.
    - b. Certified wood.
  - 2. LEED Credit MRc4 - Recycled Content: Submit certification/letter from material manufacturer indicating percentage of recycled content.
  - 3. LEED Credit MRc5 Location of Extraction, Harvest, and Manufacture: Submit documentation identifying location of extraction, harvest, and manufacture for materials supplied under this section.
  - 4. LEED Credit MRc6: Provide documentation certifying use of rapidly renewable materials for the following materials:
    - a. Agrifiber panels
    - b. Wood veneer
  - 5. LEED Credit MRc7: Provide documentation certifying the percentage of wood based products harvested from a FSC forest.
    - a. Wood
    - b. Provide wood certification submittal documentation including chain-of-custody documentation for all wood based materials installed.
    - c. Provide a spreadsheet of all wood based products used on the project highlighting certified wood based material and include calculations demonstrating that 50% of wood based materials are certified wood.
    - d. Include statement indicating total cost for wood-based materials used for Project, including non-rented temporary construction.

6. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
  - a. Adhesives and sealants.
7. LEED Credit EQc4.4: Composite wood, plywood, and agri-fiber products shall contain no added urea-formaldehyde resins.

#### **1.6 QUALITY ASSURANCE**

- A. The work of this Section shall be AWI certified.
- B. Single Source Responsibility: Fabricator is responsible for finishing and installation of casework specified in this Section.
- C. Regulatory Requirements: Comply with Authorities Having Jurisdiction and Americans with Disabilities Act (ADA) including ADA Accessibility Guidelines to accommodate barrier free design.
- D. Fabricator Qualifications: The fabricator shall be equipped for and experienced in doing work, in fabrication, finishing, and installation of quality casework having minimum of 5 years documented experience under current legal name.
- E. Certifications: Submit fabricator's certification that products furnished for Project meet or exceed specified requirements.
- F. Fabrication and Installation Standards: Fabricate and install in accordance with Architectural Woodwork Standards, Edition 2 as listed below.
  1. Lumber grades: AWS Section 3.
  2. Panel products: AWS Section 4.
  3. Standing and running trim: AWS Section 6.
  4. Casework: AWS Section 10.
  5. Countertops: AWS Section 11.

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

- A. Comply with requirements of Section 016000.
- B. Protect materials from damage, soiling, and deterioration during transit and storage.
- C. Do not deliver casework materials until Project site conditions, atmosphere and operations which could damage, soil, or deteriorate work are complete. Receiving areas shall be cleaned and free of debris; exterior openings are closed; wet work, mechanical and electrical rough-ins are coordinated and complete.
- D. Store products and materials in ventilated, interior locations under constant minimum temperature and relative humidity recommended by casework manufacturer. Provide temporary protective covers for items during delivery, temporary storage, installation, and until final acceptance of the project.

#### **1.8 PROJECT CONDITIONS**

- A. Environmental Requirements: Obtain and maintain temperature and moisture conditions as recommended by casework fabricator for storage and installation, including remainder of construction period.
- B. Field Measurements:
  1. Field measure conditions where casework is indicated to be fitted to other construction prior to fabricating work of this Section.
  2. Show final field measurements on shop drawings.
  3. Where field measurements cannot be made without delaying Project, coordinate dimensions among trades to ensure proper fit of casework.

#### **1.9 WARRANTY**

- A. Comply with provisions of Section 017700.
- B. Furnish warranty with provisions for repairing or replacing, at no additional cost to Owner, casework items that exhibit defects in material or workmanship for 2 years.

**PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Hardwood Veneer Panels: 3/4 inch thick.
  - 1. Face Veneer Species: Walnut
- B. Lumber: Graded in accordance with AWS custom; average moisture content of 6 percent; species and grade as follows:
  - 1. Internal Construction; Walnut, cut, grade
- C. Softwood Lumber: Comply with PS 20.
  - 1. Maximum Moisture Content: 6 percent.
  - 2. Species: Douglas fir, hemlock, Ponderosa pine, or Sugar pine.
  - 3. General: Provide wood from an FSC certified source.
  - 4. Provide cores from rapidly renewable source.
- D. Core Substrate: Contractor option of particleboard, MDF or Agri-fiber particleboard as specified below.
- E. Particleboard:
  - 1. Comply with ANSI A208.1, phenolic resin particleboard
  - 2. General Purpose: Type 1-M-1.
  - 3. Water Resistant: Type 2-M-2 or 2-M-3.
  - 4. Maximize post-consumer waste material content with minimum of 80 percent.
  - 5. Urea-formaldehyde free and not exceed 0.30 PPM of formaldehyde, ANSI 208.1.
- F. Medium Density Fiberboard (MDF): ASTM D1037 and ANSI A208.2, Classification M-3.
  - 1. Formaldehyde free material.
  - 2. Fire retardant treated, Class I or Class A rating.
  - 3. Density: Minimum of 48 PCF.
  - 4. Provide through-color material as selected by Architect where indicated for countertops.
  - 5. Thickness:
    - a. Panel structural components: Minimum 3/4 inch thick.
    - b. Back Panels, Drawer Components, and Drawer Bottoms: Minimum 1/2 inch thick.
    - c. Fixed Shelves, Dividers, Mounting Stretchers: Minimum 3/4 inch thick.
    - d. Semi-exposed Adjustable Shelves in Cabinets under 36 inches Wide: Minimum 3/4 inch thick.
    - e. Shelves in Cabinets 36 inches Wide or Greater: Minimum 1 inch thick.
- G. Hardboard:
  - 1. Grade: Tempered.
  - 2. Face: One face sanded.
  - 3. Thickness: 1/4 inch.
- H. Hardware:
  - 1. Drawer Slides:
    - a. General: Steel ball-bearing, full extension, 75 pound capacity minimum, drawer hold-in closed position.
    - b. Acceptable Manufacturers:
      - 1) Accuride, Santa Fe Springs, CA.
      - 2) Hettich America LP, Alpharetta, GA.
      - 3) Hafele.
  - 2. Hinges:
    - a. General: 5-knuckle hinges.
    - b. Acceptable Manufacturers:
      - 1) Julius Blum Company, Inc., Wood Ridge, NJ.
      - 2) Sugatsune, Carson, CA
      - 3) Grass America, Inc., Kernersville, NC.
      - 4) Stanley Hardware, New Britain, CT.
  - 3. Magnetic Catch: Each cabinet door.
  - 4. Cabinet and Drawer Pulls:
    - a. General: 5 inch, round bar pull type.



- b. Finish: 304 Stainless Steel - Satin
- c. BOD: Sugatsne 28 Series (28128)
- d. Acceptable Manufacturers:
  - 1) Engineered Products Company, Flint, MI.
  - 2) Sugatsune, Carson, CA
  - 3) Stanley Hardware, New Britain, CT.
  - 4) HB Ives, Wallingford, CT.
  - 5) Triangle Brass Manufacturing Company, Los Angeles, CA.
- 5. Cabinet Locks:
  - a. General: Pin tumblers, surface mounted.
  - b. Finish: US26D.
  - c. Provide on all casework except Kitchen; key by room.
  - d. Acceptable Products and Manufacturers:
    - 1) Yale Locks and Hardware, Charlotte, NC.
    - 2) Best Lock Corporation, Indianapolis, IN.
    - 3) National Cabinet Lock, Mauldin, SC.
- 6. Drawer Locks:
  - a. General: Disc or pin tumbler, surface mounted.
  - b. Finish: US26D.
  - c. Provide on all casework except Kitchen; key by room.
  - d. Acceptable Products and Manufacturers:
    - 1) Yale Locks and Hardware, Charlotte, NC.
    - 2) Knappe and Vogt Manufacturing, Grand Rapids, MI.
- 7. Shelf Support Pins:
  - a. Nickel Steel.
  - b. Location: 4 per shelf.
  - c. Acceptable Products and Manufacturers:
    - 1) Hafele 282.04.711.
    - 2) Knappe & Vogt 333.
    - 3) Lamp SS 323.
- 8. Grommets:
  - a. General: 1-1/2 inch hole, black.
  - b. Acceptable Products and Manufacturers:
    - 1) Doug Mockett and Company, Inc., Manhattan Beach, CA.
    - 2) Hafele America Company, Archdale, NC.
    - 3) Bainbridge Manufacturing.
- 9. Wire Management System:
  - a. General: Plastic, black.
  - b. Acceptable Products and Manufacturers:
    - 1) Doug Mockett and Company, Inc., Manhattan Beach, CA.
    - 2) Hafele America Company, Archdale, NC.
    - 3) Bainbridge Manufacturing.

## 2.2 ACCESSORIES AND TREATMENTS

- A. Adhesives & Sealants: Use adhesives and sealants that comply with VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
  - 1. Current requirement refers to the date on which the materials are installed in the building.
  - 2. A copy of SCAQMD Rule #1168 is referenced in Section 018113 that was current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
  - 3. Interior refers to all building construction that is inside of the exterior weatherproofing material.
- B. Fasteners: Size and type to suit application.
- C. Dowels, Bolts, Nuts, Washers, Lags, Pins, and Screws: Of size and type to suit application; finish in exposed locations.

- D. Concealed Joint Fasteners: In conformance with WIC.
- E. Sealer:
  - 1. Benjamin Moore: Sanding Sealer Clear No. 253.
  - 2. Fuller O'Brien: Super Nap Seal and Finish No. 255-04.
  - 3. Glidden: Ultra-Hide Quick Dry Sanding Sealer No. Y-5035.
  - 4. PPG: Speedhide Alkyd Sanding Sealer, 6-10.

## 2.3 FABRICATION

- A. General:
  - 1. General quality to be AWI Custom Grade – Flush Overlay Type.
  - 2. Do not locate joints within 2 foot of sink cut-out.
  - 3. Provide edge bands on exposed edges including front and back of shelves.
  - 4. Deliver to site in units sized for ease for handling and to permit passage through building openings.
  - 5. Door and Drawer Fronts: 3/4 inch thick; flush overlay style.
  - 6. Prime with sealer concealed and semi-concealed surfaces. Brush apply only.
  - 7. Provide cutouts for plumbing fixtures, hardware, inserts, appliances, electrical work, and other fixtures. Verify locations of cutouts from site dimensions. Seal or prime paint contact surfaces of cutouts.
  - 8. Route or groove back of flat trim members, kerf backs of other wide flat members except plywood members.
  - 9. When necessary to cut and fit on site, provide materials with ample allowance for cutting. Provide trim for scribing and site cutting.
  - 10. Provide cutouts for plumbing fixtures, and fitting and electrical accessories.. Verify locations of cutouts on shop drawings from site conditions. Seal surfaces of cut edges.
  - 11. Grade Stamp: Arrange for and pay costs of WI inspections, and obtain WI Certified Compliance Label on each unit of casework indicating grade specified.
- B. Construction:
  - 1. Base Cabinets:
    - a. Use finished end panels unless condition will be fully concealed.
    - b. Provide finished toe space fronts, finished to match cabinet front.
  - 2. Wall Cabinets:
    - a. Provide finished end panels unless condition will be fully concealed.
    - b. Provide continuous 1 inch by 3 inch anchor cleat at top and bottom of cabinet interior full width of unit. Secure cleat in rabbet over back, then glue and spot pin.
  - 3. Countertops:
    - a. Provide with 2 inch deep face edge, faced with high pressure laminate unless noted or shown otherwise.
    - b. Provide loose 4 inch high pressure laminate covered splashes typically at countertops unless taller splashes shown or noted.
  - 4. Shelving:
    - a. 3/4 inch thick up to 36 inch unsupported length.
    - b. 1 inch thick for over 36 inch unsupported lengths.

## 2.4 FINISHING

- A. Pre-Finishing
  - 1. Sand work smooth and set exposed nails and screws.
  - 2. Apply wood filler in exposed nail and screw indentations
  - 3. On items to receive transparent finishes, use wood filler which matches surrounding surfaces and of types recommended for applied finishes.
  - 4. Finish work in accordance with WI.
- B. Finishing
  - 1. Comply with *Architectural Woodwork Standards*, Section 5 for types of factory applied finish systems indicated.
  - 2. Contractor's Option: AWS System 11 Catalyzed Polyurethane or AWS System 5 Conversion Varnish , transparent finish: 1. Quality Grade: Custom.

3. Stain: To match sample.
4. Degree of Sheen: Medium rubbed.
5. Seal top and bottom edges, vision panel cutouts, and mortised hardware cutouts using manufacturer's standard sealer.
6. Metal edges, metal vision panel frames, and astragals: 1. Manufacturer's standard oven cured low luster enamel.
7. Custom colors selected by Architect.
8. Finish hardwood moldings to match face veneers.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Verify that blocking is in place before beginning work.
- C. Verify that field measurements are as shown on shop drawings.
- D. Verify that mechanical, electrical, and other items affecting work of this section are in place and ready to receive the work.
- E. Verify building HVAC systems are operating and temperature and moisture conditions as recommended by woodwork fabricator for installation have been achieved and will remain in effect for remainder of construction period.

#### **3.2 PREPARATION**

- A. Seal concealed surfaces and items or assemblies which will be in contact with cementitious materials or surfaces.
- B. Make field cuts with extreme care to avoid splintering.

#### **3.3 INSTALLATION**

- A. General:
  1. Install in accordance with Section 017300 and approved shop drawings.
  2. Install work in accordance with specified AWS quality standards.
  3. Distribute defects allowed in quality grade to best overall advantage when installing Project assembled woodwork items.
  4. Shim as required using concealed shims.
  5. Before making cutouts, drill pilot holes at corners.
  6. Tolerances for field assemblies and joined items:
    - a. Maximum Variation from True Position: 1/16 inch unless otherwise specified or required by AWS grade.
    - b. Maximum Offset from True Alignment with Abutting Materials: 1/32 inch unless otherwise specified or required by AWS grade.
  7. Set and secure casework and components. Use joint fasteners to align and secure adjoining cabinets and countertops. Affix base cabinets to floor.
  8. Secure to anchors, built-in blocking, or directly attach to substrates where capable of adequately supporting load. Use toggle bolt type fasteners for wall mounted components. Secure countertops to base cabinets.
  9. Install hardware in accordance with manufacturer's recommendations. Adjust and leave in proper working order.
- B. Field Fitting:
  1. Cut to fit and carefully scribe.
  2. Where work abuts other finished surfaces, scribe and cut for accurate fit.
  3. Do not use overlay trim pieces to cover joints.

#### **3.4 CLEANING AND PROTECTION**

- A. Protect casework from marring, defacement, or other damage until final completion.
- B. Clean spaces of debris and vacuum and wipe down casework. Leave in condition ready for use.

**3.5 SCHEDULES OF CASEWORK ITEMS**

- A. General:
  - 1. Refer to Drawings for locations and dimensions.
  - 2. Quality Standard: Premium unless noted otherwise.
- B. Plastic Laminate Countertops:
  - 1. Provide with 2 inch deep face edge to match countertop unless indicated otherwise.
  - 2. Provide loose 4 inch splashes to match countertop unless indicated otherwise.
  - 3. Tops with Sinks: Water resistant particleboard.
- C. Solid Surface Countertops: Refer to Section 123663.
- D. Quartz Countertops: Refer to Section 123664.

**END OF SECTION**

**SECTION 066600****CUSTOM ORNAMENTAL SIMULATED WOODWORK****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes: PVC fabrications used as trim and other applications indicated on the Drawings.
- B. Related Sections:
  - 1. Section 099000 – Painting and Coating: Finish painting.

**1.2 SUBMITTALS**

- A. General: Submit following items in accordance with Section 013300.
- B. Product Data: For each type of product specified. Include identification of materials; dimensions of individual components; installation instructions; and available profiles, textures, and colors.
- C. Samples for Verification: Full-size units of each type of panel and trim indicated; in sets for each color, texture, and pattern specified.

**1.3 QUALITY ASSURANCE**

- A. Source Limitations for Paneling and Accessories: Obtain each type of trimboard, and related accessories 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 materials to Project site in manufacturer's unopened packages or bundles with labels intact.
- B. Store materials in a dry, well-ventilated, weathertight place. Comply with manufacturers written instructions for storage, handling, and protection.

**1.5 PROJECT CONDITIONS**

- A. Weather Limitations: Proceed with panel installation only if existing and forecasted weather conditions permit panels to be installed according to manufacturer's written instructions and if substrate is completely dry.

**1.6 EXTRA MATERIALS**

- A. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with labels describing contents. Furnish full lengths of paneling in a quantity equal to 2 percent of amount installed.

**PART 2 - PRODUCTS****2.1 PVC FABRICATIONS**

- A. Acceptable Products and Manufacturer: AZEK Trimboards, Vycom Corporation, Moosic, PA. Or approved substitute.
- B. Material: Expanded rigid poly vinyl chloride material with a small-cell microstructure and density of 0.55 grams/cm<sup>3</sup>.
  - 1. Profiles and Sizes: As indicated on Drawings.
  - 2. Texture: Smooth.
  - 3. Finish: Factory primed for field finishing.

**2.2 ACCESSORIES**

- A. Fasteners: Stainless steel or galvanized, in sufficient length to penetrate substrate. Countersink fasteners to be flush.
  - 1. Use fasteners designed for wood trim and wood siding (thinner shank, blunt point, full round head). Nail guns are acceptable.
  - 2. Staples, small brads and wire nails are not allowed.
- B. Adhesive: Manufacturer's recommended, solvent or latex based adhesive systems.
- C. Sealants: Manufacturer's recommended urethane, polyurethane, or acrylic based sealants without silicone.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine substrates for compliance with manufacturer's requirements for substrates, installation tolerances, and other conditions affecting performance of panels. Do not proceed with installation until unsatisfactory conditions have been corrected.

**3.2 PREPARATION**

- A. Clean substrates of projections and substances detrimental to application.
- B. Coordinate installation with flashings and other adjoining construction.

**3.3 INSTALLATION**

- A. Comply with manufacturer's written installation instructions applicable to products and applications indicated, unless more stringent requirements apply.
- B. Cut, drill, mill, and rout similar to that of lumber and in accordance with manufacturer's instructions. Finish edges by sanding, grinding or filling with traditional woodworking tools.
- C. Expansion and Contraction: Allow for 1/8 inch movement for each 18 feet of board.
- D. Fasteners:
  - 1. Use a minimum of 2 fasteners per framing member for trimboard applications. Trimboards 12 inches or wider and sheets, will require additional fasteners.
  - 2. Install fasteners no more than 2-inches from the end of each board.
  - 3. Fasten fabrications into a flat, solid substrate. Avoid hollow or uneven areas.
  - 4. Take caution when installing in low temperatures; pre-drilling may be required.
- E. Butt Joints: Glue butt joints with PVC cement.
  - 1. Test adhesive for compatibility with substrate prior to installation.
  - 2. Glue joints to prevent joint separation. Secure with a fastener and/or fasten on each side of the joint to allow adequate bonding time.
- F. Align exposed fasteners for a uniform appearance.
- G. No exposed joints except where detailed.
- H. Apply finish coatings as specified in Section 099000.

**3.4 ADJUSTING AND CLEANING**

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

**END OF SECTION**

**SECTION 071113**  
**BITUMINOUS DAMPPROOFING**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes: Bituminous dampproofing for foundation walls; transition to air barrier assembly for continuity.
- B. Related Sections:
  - 1. Section 042000 – Masonry Units.
  - 2. Section 072700 – Air Barrier.
  - 3. Section 072100 – Thermal Insulation: Cavity wall insulation.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit product data for each product.
- C. Shop Drawings: Show locations and extent of dampproofing and details of all typical conditions, intersections with other envelope systems and materials, and details showing how gaps in the construction will be bridged, how inside and outside corners are negotiated and how transition to air barrier is made.
- D. Submit following Informational Submittals:
  - 1. Qualification Data: Applicator's qualification data.
  - 2. Manufacturer's instructions.

**1.3 QUALITY ASSURANCE**

- A. Applicator Qualifications: Acceptable to manufacturer with documented experience on at least 5 projects of similar nature in past 3 years.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Store emulsions at temperature above 40 degrees F.

**1.5 PROJECT CONDITIONS**

- A. Environmental Conditions:
  - 1. Maintain ambient and surface temperature above 40 degrees F for 24 hours before application and continuously until dampproofing has cured.
  - 2. Do not allow dampproofed surfaces to be exposed to prolonged sunlight.
  - 3. Proceed with dampproofing only when existing and forecasted weather conditions will permit materials to be applied in accordance with manufacturer's recommendations.
- B. Substrate: Proceed with dampproofing work only after substrate construction and penetrating work have been completed.

**PART 2 - PRODUCTS****2.1 MATERIALS AND COMPONENTS**

- A. Emulsion Based Semi-Mastic Dampproofing:
  - 1. Non-asbestos short fiber reinforced emulsion asphaltic compound meeting requirements of ASTM D1227, Type IV.
  - 2. Application: Brush or spray.
  - 3. Thickness: Primer and 2 coats for 1/16 inch minimum.
  - 4. Acceptable Products and Manufacturers:
    - a. A-H Semi-Mastic Emulsion, Anti-Hydro International, Inc.
    - b. Emulsified Asphalt Semi-Mastic, Euclid Chemical Company.
    - c. Karnak 220, Karnak Corporation.

- d. Sealmastic Type II, W. R. Meadows, Inc.
  - e. Hydrocide 700B, Sonneborn Building Products.
- B. Accessories:
  - 1. Primer: Manufacturer's recommended primer for conditions encountered.
  - 2. Reinforcing mesh: Treated glass fabric, woven design, 20 by 10 mesh.
  - 3. Protection Board: Performed sheet or board, 1/8 inch thick; Sealtight Protection Course PC-2 by W. R. Meadows, Inc., Elgin, IL, or Protection Course II by Sonneborn Building Products, Shakopee, MN.
  - 4. Rigid board insulation: Extruded polystyrene specified in Section 072100.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Verify substrate surfaces are structurally sound.
- C. Do not apply during inclement weather, or if surface is frozen, damp, dirty, or dusty.
- D. Verify that items penetrating dampproofing system are securely anchored.

#### **3.2 PREPARATION**

- A. Remove rough or sharp projections, loose particles, and foreign matter detrimental to adhesion and application of dampproofing.
- B. Clean, prepare, and prime surfaces to receive dampproofing in accordance with manufacturer's instructions.
- C. Do not allow primer or dampproofing to migrate onto adjacent surfaces. Protect surfaces as necessary.
- D. Seal penetrations and cracks, and reinforce changes in substrate and other areas as recommended by dampproofing manufacturer.
- E. Fill voids as recommended by dampproofing manufacturer.

#### **3.3 APPLICATION**

- A. Apply materials in accordance with Section 017300.
- B. Apply semi-mastic materials in 2 coat process by brush at rate not less than 4 gallons per 100 square feet for nominal 1/16 inch wet film thickness per coat. Allow 24 hours minimum cure between coats.
- C. Fill in crevices and grooves making coating continuous and free from breaks and pin holes. Apply around joints, anchors and into chases, corners and reveals. Reinforce dampproofing with glass fiber mesh at changes in direction.
- D. Protection Board:
  - 1. Install separate protection board system over cured membrane and retain in place using methods recommended by manufacturer.
  - 2. Protection board may be installed into uncured membrane if approved in writing by manufacturer.
  - 3. Install in single layer with tight butt joints.
- E. Rigid Board Insulation:
  - 1. Install rigid insulation over cured membrane and retain in place using methods recommended by manufacturer.
  - 2. Insulation board may be installed into uncured membrane if approved in writing by manufacturer.
  - 3. Install in single layer with tight butt joints.

#### **3.4 FIELD QUALITY CONTROL**

- A. Comply with requirements of Section 014000.



- B. Inspections:
  - 1. Before initial set takes place, periodically verify applied thickness by use of wet mil thickness gage as work progresses. In deficient areas apply additional materials to produce required thickness.
  - 2. Visually inspect surfaces for voids, ruptures and damages; make necessary repairs.

### **3.5 PROTECTION AND CLEANING**

- A. Protect finished work in accordance with Section 017300.
- B. Protect adjacent surfaces; remove dampproofing from surfaces which remain exposed to view or where inadvertently applied.

**END OF SECTION**



**SECTION 072100**  
**THERMAL INSULATION**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Batt insulation.
  - 2. Extruded polystyrene board insulation.
  - 3. Rated duct enclosure.
- B. Related Sections:
  - 1. Section 072700 – Air Barriers
  - 2. Section 074600 – Fiber Cement Siding: Subgirt coordination.
  - 3. Section 075419 – Polyvinyl Chloride Roofing: Roof Insulation.
  - 4. Section 078400 – Firestopping: Firesafing insulation.
  - 5. Section 079200 – Joint Sealants: Spray Foam Insulating Seals.
  - 6. Section 092900 – Gypsum Board: Acoustical Insulation.
- C. This Project is a registered US Green Building Council “LEED” project.
  - 1. Select materials to maximize use of recycled materials.
  - 2. Select locally or regionally fabricated products wherever possible.
  - 3. Select adhesives and sealants meeting LEED requirements.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit product data for each product.
- C. Submit following Informational Submittals: Manufacturer's instructions.
- D. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Extruded Polystyrene Insulation.
  - 2. LEED Credit MRc4: Provide Recycled content data for each different product type, size and manufacturer used for the following materials:
    - a. Recycled content materials claims shall meet the following requirements:
      - 1) Defined in accordance with the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e). This document is available at [www.ftc.gov/bcp/gnrule/guides980427.htm](http://www.ftc.gov/bcp/gnrule/guides980427.htm).
      - 2) The recycled content of each material shall be provided for the percentage by weight of post-consumer and pre-consumer content, as defined in the document referenced above, used in each product type used.
  - 3. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
    - a. Adhesive

**1.3 QUALITY ASSURANCE**

- A. Single Source Responsibility: Furnish each insulation type from one manufacturer for entire Project, unless otherwise acceptable to Architect.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Identify products with appropriate markings of applicable testing and inspecting organization.

- C. Storage and Protection:
1. Store materials raised off floor or ground and under cover to keep dry.
  2. Protect from weather, direct sun light, contamination, sources of ignition, and damage from construction operations.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Batt (Blanket) Insulation:
1. Fiberglass Batt Insulation - Vapor Retarder: Glass fiber composition with integral fire retardant foil reinforced kraft laminate vapor retarder.
    - a. Classification: ASTM C665, Type III, Class A.
    - b. Fire Rating: ASTM E84, Flame spread 25 or less and smoke development 450 or less.
    - c. Thermal Resistance "R" values as indicated.
    - d. Acceptable Products:
      - 1) Flame-Resistant Foil Insulation (FSK25), CertainTeed Corp.
      - 2) FSK25, Manville Building Insulation, Johns Manville International, Inc.
      - 3) Flame Spread 25 Insulation, Owens Corning Fiberglas Corp.
    - e. Location: Exterior walls including return air plenums.
  2. Fiberglass Batt Insulation - Unfaced: Glass fiber composition, friction fit type, unfaced.
    - a. Classification: ASTM C665, Type I.
    - b. Fire Rating: ASTM E84, Flame spread 25 or less and smoke development 450 or less.
    - c. Thermal resistance "R" values as indicated.
    - d. Acceptable Products:
      - 1) Unfaced Building Insulation, CertainTeed Corp.
      - 2) Unfaced Commercial Insulation, Building Insulation, Johns Manville International, Inc.
      - 3) Unfaced Light Density Thermal Insulation, Owens Corning Fiberglas Corp.
    - e. Location: As indicated.
- B. Extruded Polystyrene Board Insulation:
1. General:
    - a. Not manufactured using chlorofluorocarbons (CFCs) and maximize use of recycled material.
    - b. Square edges.
    - c. Thermal resistance "R" value: 5 per inch
    - d. Thickness: As indicated.
  2. Classification:
    - a. Foundation Wall: ASTM C578, Type IV (25 PSI)
    - b. Under Slab: ASTM C578, Type VI (40 PSI).
    - c. Cavity Wall: ASTM C578, Type IV (25 PSI)
  3. Fire Rating: ASTM E84, 1 inch thick test material, flame spread 10 or less, smoke development 200 or less.
  4. Acceptable Products:
    - a. Foundation Walls:
      - 1) GreenGuard XPS Type IV 25 PSI Board by Kingspan.
      - 2) Styrofoam Square Edge by The Dow Chemical Company.
      - 3) Foamular 250 by Owens Corning Foamular.
    - b. Under Slab:
      - 1) GreenGuard XPS Type VI 40 PSI Board by Kingspan.
      - 2) Styrofoam High Load 40 by The Dow Chemical Company.
      - 3) Foamular 400 by Owens Corning Foamular.
    - c. Cavity Walls: Masonry and behind fiber cement board siding.
      - 1) GreenGuard XPS Type IV 25 PSI by Kingspan.
      - 2) Styrofoam Cavity Mate by The Dow Chemical Company.
      - 3) Foamular CW25 by Owens Corning Foamular.

- C. Rated Duct Enclosure: Where ducts are noted to be enclosed in a rated enclosure, the ducts shall be enclosed in Thermafiber mineral fireproofing by Owens Corning Thermafiber, or approved equal. The thickness and design of the enclosure shall depend on the fire rating noted or, if not noted, as required by prevailing code. All installations shall be in accordance with test designs by Underwriters Laboratories. All products and installation must provide the required fire resistance rating.
- D. Refer to Section 075419 for roof insulation.
- E. Refer to Section 078400 for fire safing insulation.
- F. Refer to Section 092900 for acoustical insulation.

## 2.2 ACCESSORIES

- A. Insulation Fasteners: Impale clip type with retaining disc or plate, galvanized steel, adhered or mechanically fastened to surface to receive insulation, length to suit insulation thickness, capable of securely fastening insulation in place.
- B. Tape: Self-adhering pressure sensitive, compatible with insulation, foil type recommended by manufacturer of insulation.
  - 1. Fire Rating: ASTM E84, flame spread 25 or less and smoke developed of 50 or less.
- C. Adhesive: Construction adhesive compatible with insulation, air barrier, and substrate. Type recommended by manufacturer of insulation.
- D. Adhesives & Sealants: Use adhesives and sealants in the interior of the building that comply with VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
  - 1. Current requirement refers to the date on which the materials are installed in the building.
  - 2. SCAQMD Rule #1168 is referenced in Section 018113 that was current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
  - 3. Interior refers to all building construction that is inside of the exterior weatherproofing material.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Verify that work of other trades which will be covered by insulation is complete, approved, and tested.

### 3.2 INSTALLATION

- A. General: Comply with Section 017300.
- B. Batt Installation:
  - 1. Install insulation after plumbing, mechanical, and electrical services have been installed.
  - 2. Provide mechanical fasteners, wire mesh, or other accessories to ensure insulation remains in specified position.
  - 3. Fit insulation tight within spaces and tight to exterior side of plumbing, mechanical, and electric services within plane of insulation leaving no gaps or voids.
  - 4. Butt insulation tightly.
  - 5. Cut and fit tightly around items penetrating insulation.
  - 6. Stagger butt joints.
  - 7. Use batts free of damage.
  - 8. Install insulation within metal framing systems full height and width. Do not allow voids or openings to occur. Insulation is required for full width between studs, including cavity of each stud.
  - 9. Cut and trim insulation neatly, to fit spaces.
  - 10. Cut insulation oversize to ensure tight butt joints when installed. Cut insulation to fit around protrusions and irregularly shaped projections.

- C. Batt Insulation with Vapor Barrier:
  - 1. Install insulation with factory applied barrier facing warm-in-winter side of building spaces.
  - 2. Tape seal butt ends and lapped side flanges. Tape and seal tears and cuts in barrier.
- D. Foundation Insulation:
  - 1. Install extruded polystyrene board insulation on foundation perimeter with adhesive in accordance with manufacturer's instructions.
  - 2. Stagger board joints.
  - 3. Butt edges and ends tight to adjacent board and to protrusions.
  - 4. Extend boards over expansion joints, unbonded on one side of joint.
- E. Under Slab Insulation:
  - 1. Place extruded polystyrene board insulation under slabs where designated after base for slab has been compacted and vapor barrier placed.
  - 2. Place insulation with tight butt joints.
  - 3. Prevent insulation from being displaced and damaged while placing slab.
- F. Cavity Wall Insulation. Masonry and Siding:
  - 1. Install extruded polystyrene insulation boards horizontally beginning at bottom of cavity.
  - 2. Secure insulation with adhesive.
  - 3. Stagger joints between courses.
  - 4. Place boards in method to maximize contact bedding.
  - 5. Butt edges and ends tight to adjacent board and to protrusions.
  - 6. Cut and shape insulation with knife, handsaw, or other cutting tool as required to fit around penetrations, projections, and openings to accommodate conduit or other services.
  - 7. Seal cut-outs with manufacturer's recommended sealant.

### **3.3 PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. Protect insulation from moisture until building is made watertight.

#### **END OF SECTION**

**SECTION 072600**  
**VAPOR RETARDERS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes: Vapor retarders for use below slabs-on-grade.
- B. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select locally or regionally fabricated products wherever possible.

**1.2 DEFINITIONS**

- A. Perm: 1 grain/h•ft<sup>2</sup>•in-Hg.

**1.3 SUBMITTALS**

- A. General: Submit following items in accordance with Section 013300.
- B. Product Data: Submit product data for each product, including tape.
- C. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Vapor Retarders.
  - 2. LEED Credit MRc5: Provide manufacturer name, source of manufacture or final assembly for the following materials:
    - a. Vapor Retarders.

**1.4 DELIVERY, STORAGE AND HANDLING**

- A. Comply with requirements of Section 016000

**1.5 SEQUENCING**

- A. Begin installation only after substrate work is complete and penetrations are securely anchored.

**PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Vapor Barrier (15 mil):
  - 1. Provide materials tested for use under slab-on-grade and successfully passing ASTM E154, Sections 8, 11, 12, and 13.
    - a. Material shall conform to the requirements under the following conditions: when tested in accordance with
      - 1) Test Methods ASTM E154, Section 7 (based on Test Methods ASTM E96/E96M), or Test Method ASTM F1249, test temperature shall be 73.4°F (23°C) and test humidity shall be 50 +/- 2 %.
      - 2) 7.1.1 Permeance of New Material—No conditioning.
      - 3) 7.1.2 Permeance after Wetting, Drying, and Soaking—Refer to Test Methods ASTM E154, Section 8.
      - 4) 7.1.3 Permeance after Heat Conditioning—Refer to Test Methods ASTM E154, Section 11.
      - 5) 7.1.4 Permeance after Low Temperature Conditioning—Refer to Test Methods ASTM E154, Section 12.
      - 6) 7.1.5 Permeance after Soil Organism Exposure—Refer to Test Methods ASTM E154, Section 13.
  - 2. Virgin waterproof metallocene polyolefin film; recycled materials not allowed.
  - 3. Comply with ASTM E1745, Class A minimum.
  - 4. Tensile Strength: 45 pound/inch minimum, ASTM E154, Section 9.

5. Permeance: ASTM E96, Procedure A; 0.009 perms maximum.
6. Puncture Resistance: 2200 grams minimum, ASTM D1709, Method B
7. Acceptable Product:
  - a. Stego Wrap 15 mil Class A, Stego Industries, LLC.
  - b. Ecoshield E15 by Epro.
  - c. Vaporguard by Reef Industries.
- B. Joint Tape: Manufacturer's recommended, pressure sensitive type, self-adhering, and of perm rating not less than vapor retarder.
- C. Pipe Boots: Construct pipe boots from vapor barrier material and pressure sensitive tape per manufacturer's instructions.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify that substrate work is complete, clean and dry before beginning installation of sheet products.

#### **3.2 INSTALLATION**

- A. Under Slab-on-Grade:
  1. Install vapor retarder in accordance with manufacturer's written instructions, ACI publication 302 "Guide for Concrete Floor and Slab Construction", and ASTM E1643.
  2. Lay-out sheets to minimize quantity of joints. Lap edge and end joints 12 inches minimum and continuously seal with joint tape. Lay sealant bead or double stick tape between layers that overlap.
  3. Seal penetrations, including pipes, with manufacturer's pipe boot. Seal around pipes, plumbing risers, electrical conduit, and other slab penetrations.
  4. Turn down sheets 12 inches at perimeter; at footers and vertical walls, and against penetrations. Seal joints and terminations with tape. Cut off excess material after concrete has been installed and reviewed by the Architect.

#### **3.3 PROTECTION**

- A. Protect sheets from puncture during installation. Patch punctures before proceeding with subsequent construction.
- B. Install runway planks in construction traffic lanes until slabs are poured.
- C. Patches: Lay patch over damaged areas and seal around patch using same method described above for overlapping sheets.

**END OF SECTION**



**SECTION 072700****AIR BARRIER****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section includes fluid applied air barrier for use over exterior wall sheathing substrates and transition material between dissimilar substrates.
- B. Related Sections:
  - 1. Section 042000 – Masonry Units.
  - 2. Section 061643 – Gypsum Sheathing.
  - 3. Section 072100 – Thermal Insulation: Cavity wall insulation.

**1.2 DEFINITIONS**

- A. Perm: 1 grain/h•ft<sup>2</sup>•in-Hg.

**1.3 PERFORMANCE REQUIREMENTS**

- A. Provide a fluid applied, vapor permeable, air barrier system constructed to perform as a continuous air barrier, and as a liquid water drainage plane flashed to discharge to exterior any incidental condensation or water penetration.
- B. Membrane shall accommodate movements of building materials by providing expansion and control joints as required, with accessory air seal materials at such locations, changes in substrate and perimeter conditions.
- C. Air Barrier Characteristics:
  - 1. Continuous, with joints and transitions made air-tight.
  - 2. Air permeability not to exceed 0.004 cubic feet per minute per square foot under pressure differential of 0.3 in. water (1.57 psf) when tested in accordance with ASTM E2178.
  - 3. Meet ASTM E2357 requirements.
  - 4. Withstand positive and negative combined design wind, fan and stack pressures on envelope without damage or displacement, and transfer load to structure.
  - 5. Air barrier shall not displace adjacent materials under full load.
  - 6. Air barrier shall be joined in airtight and flexible manner to air barrier material of adjacent systems, allowing for relative movement of systems due to thermal and moisture variations and creep.
  - 7. Connection shall be made between:
    - a. Foundation, dampproofing, and walls.
    - b. Walls and windows or door frames.
    - c. Different wall systems.
    - d. Walls to flashings.
    - e. Wall and roof.
    - f. Wall and roof over unconditioned space.
    - g. Walls, floor and roof across construction, control and expansion joints.
    - h. Walls, floors and roof to utility, pipe and duct penetrations.
  - 8. Air Barrier Penetrations: Penetrations of air barrier and paths of air infiltration / exfiltration shall be made air-tight.
  - 9. Comply with Air Barrier Association of America's (ABAA's) definition of a tested system.

**1.4 SUBMITTALS**

- A. General: Submit following items in accordance with Section 013300.
- B. Product Data:
  - 1. Submit product data for each product including membrane, primers, sealants, adhesives, and auxiliary materials.

2. Include manufacturer's printed instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, technical data, and tested physical and performance properties.
3. Provide test results of specified system using ASTM E2357.
- C. Shop Drawings: Show locations and extent of air barrier and details of all typical conditions, intersections with other envelope systems and materials, membrane counter-flashings, and details showing how gaps in the construction will be bridged, how inside and outside corners are negotiated and how miscellaneous penetrations such as conduits, pipes electric boxes and the like are sealed.
- D. Samples: Provide sample of product applied to the following substrates:
  1. CMU.
  2. Exterior gypsum sheathing.
- E. Submit following Informational Submittals:
  1. Certifications specified in Quality Assurance article.
  2. Installer qualifications.
  3. Manufacturer's instructions.
- F. Closeout Submittals:
  1. Submit under provisions of Section 017700.
  2. Warranty: Submit specified warranty.

### **1.5 QUALITY ASSURANCE**

- A. Single-Source Responsibility:
  1. Obtain air barrier materials from a single manufacturer regularly engaged in manufacturing the product.
  2. Provide products which comply with all state and local regulations controlling use of volatile organic compounds (VOCs).
- B. Manufacturer Qualifications: Manufactures materials licensed and certified by Air Barrier Association of America's (ABAA's) Quality Assurance Program.
- C. Installer Qualifications:
  1. Certified in writing by system manufacturer as qualified for specified systems.
  2. Certified during bidding period as well as for the duration of the installation, as officially recognized Licensed Contractor by the Air Barrier Association of America (ABAA).
  3. Installer shall carry liability insurance and bonding.
  4. Each worker who is installing air barriers must be either a Certified Applicator or an installer who is registered with ABAA
  5. Air barrier installers must be trained and certified by NECA (National Energy Conservation Association) and PSDI (Professional Skills Development Institute for energy conservation).
- D. Certifications:
  1. Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.
  2. Submit manufacturer's certification stating that installed system is in compliance with specified requirements.
  3. Certification by air barrier manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
  4. Certification of compatibility by air barrier manufacturer, listing all materials on the project that it connects to or that come in contact with it.

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

- A. Comply with requirements of Section 016000.

### **1.7 MOCK-UPS**

- A. Construct mock-up in accordance with Drawing Sheet A-053 and Section 014000.
- B. Include mock-up of product on both exterior gypsum sheathing and CMU substrates.

- C. Include transitions and interface with damp proofing, and roof assembly, tie-in at fenestration and integration of accessories included to accommodate movement.

### **1.8 PREINSTALLATION CONFERENCE**

- A. Conduct pre-installation conference in accordance with Section 013100.
- B. Attendees: Trades affected by air barrier installation.
- C. Agenda:
  - 1. Review Project Specifications and Drawings.
  - 2. Establish installation schedules and sequence.
  - 3. Coordinate work with in-place and subsequent construction.
  - 4. Review weather and working conditions.
  - 5. Review installation procedures, including:
    - a. Substrate requirements for Project acceptance (curing of concrete surface, form release agents, temperature).
    - b. Material installation.
    - c. Phasing and sequencing requirements.
    - d. Termination, flashing, expansion joint, and penetration requirements.
- D. Conduct tour of areas to receive air barriers and report on surface acceptance, possible problem areas, and recommended remedies.

### **1.9 SEQUENCING**

- A. Begin installation only after substrate work is complete and penetrations are securely anchored.

### **1.10 PROJECT CONDITIONS**

- A. Environmental Conditions: Apply air barrier within range of ambient and substrate temperatures recommended by air barrier manufacturer. Do not apply air barrier to a damp or wet substrate, unless the manufacturer specifically permits that for the product.
  - 1. Do not apply air barrier in snow, rain, fog, or mist.
  - 2. Do not apply air barrier when the temperature of substrate surfaces and surrounding air temperatures are below those recommended by the manufacturer.

### **1.11 WARRANTY**

- A. Comply with requirements of Section 017700.
- B. Provide manufacturers warranty for period of 5 years from date of Substantial Completion.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Primers: As recommended by manufacturer for project conditions and substrates encountered.
- B. Fluid Applied Vapor Permeable Air Barriers:
  - 1. One component, rubberized (elastomeric), fluid applied material.
  - 2. Color: Manufacturer's standard.
  - 3. Compatible with extruded polystyrene insulation adhesive in cavity wall construction.
  - 4. Performance Characteristics:
    - a. Solids by Weight: 50 percent minimum.
    - b. Water Vapor Permeance: 11 perms minimum, ASTM E96.
    - c. Elongation: ASTM D412, 150 percent minimum.
    - d. Peel Strength: ASTM C836 or ASTM C836, 10 lbf/inch minimum.
  - 5. Air Permeability:
    - a. 1.6 PSF air pressure: 0.00010 CFM/sq. ft.
    - b. 5.2 PSF air pressure: 0.00014 CFM/sq. ft.
    - c. 6.3PSF air pressure: 0.00015 CFM/sq. ft.
  - 6. Basis of Design Product:
    - a. Air-Bloc 31MR, Henry Company.
    - b. Air-Shield LMP, WR Meadows.

- c. Perm-A-Barrier VPL, GCP Applied Technologies.
  - d. Location: Use as an air barrier on gypsum and masonry substrates.
- C. Transition Membrane:
  - 1. Self-adhering membrane consisting of an SBS rubberized asphalt compound, integrally laminated to polyethylene film.
  - 2. Thickness: 40 mils.
  - 3. Performance Characteristics:
    - a. Tensile Strength: ASTM D412 modified, 400 psi minimum.
    - b. Minimum Puncture Resistance: ASTM E154, 40 lbf.
    - c. Elongation: ASTM D412, 200 percent.
  - 4. Compatible with fluid applied air/vapor barrier.
  - 5. Note that self-adhered membrane flashing with asphaltic backing should not be in contact with silicone sealants or other silicone enclosure materials. Also, note that asphaltic materials should not be in direct contact with PVC roofing. Provide appropriate transition material as applicable for compatibility.
  - 6. Transition Primer: As recommended by manufacturer for compatibility with transition membrane.
  - 7. Basis of Design Product:
    - a. Blueskin SA, Henry Co.
    - b. Air-Shield, WR Meadows.
    - c. Perm-A-Barrier Detail Membrane, GCP Applied Technologies.
- D. Through-wall Flashing Membrane: Refer to Section 042000.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify that substrate work is complete, clean and dry before beginning installation of air barrier materials.
  - 1. Do not proceed with installation until after minimum curing period recommended by air barrier manufacturer.
  - 2. Ensure that:
    - a. Surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar or other contaminants.
    - b. Concrete surfaces are cured and dry, smooth without large voids, spalled areas or sharp protrusions.
    - c. Masonry joints are flush and completely filled with mortar, and all excess mortar sitting on masonry ties has been removed.
  - 3. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263.

#### **3.2 PREPARATION**

- A. Fluid Applied Air Barriers:
  - 1. Remove rough or sharp projections, loose particles, and foreign matter detrimental to adhesion and application of fluid applied air barriers.
  - 2. Clean and prepare surfaces to receive air barriers in accordance with manufacturer's instructions.
  - 3. Seal penetrations and cracks, and reinforce changes in substrate and other areas as recommended by manufacturer.
  - 4. Apply manufacturer's recommended primer when required for substrate application.
  - 5. Fill voids as recommended by manufacturer.
- B. Joint and Crack Treatment:
  - 1. Fill joints between panels of exterior grade gypsum up to 1/4 inch wide with trowel application of air barrier material and reinforce with a strip of 2 inch wide glass fiber tape prior to application of liquid membrane. Joints between panels of exterior grade gypsum wider than 1/4 inch should be sealed with transition ☐ membrane adhered to the substrate.

2. Surfaces should be tied in with beams, columns, window and doorframes, etc.; using strips of transition membrane lapped a minimum of 3 inches on both substrates. Mechanical attachment should be made to all window and doorframes, or a properly designed sealant joint provided.
3. Seal cracks in masonry and concrete with a strip of transition ☐ membrane lapped a minimum of 3 inches on both sides of the crack.

### 3.3 INSTALLATION

- A. Transition Membrane
  1. Apply primer as recommended by manufacturer.
  2. Align, position, and adhere transition membrane as required by manufacturer, and press firmly into place. Ensure minimum 3 inch overlap at all end and side laps.
  3. Tie-in to window frames, hollow metal door frames, spandrel panels, roofing system and at the interface of dissimilar materials as indicated in drawings, providing a minimum 2 inch adhesion on metal and 2 inch on membranes.
  4. Promptly adhere laps and membrane.
  5. Ensure all preparatory work is complete prior to applying air barrier.
- B. Through-wall Flashing: Refer to Section 042000.
- C. Fluid Applied Air Barrier:
  1. Do not apply to wet surfaces.
  2. Apply within manufacturer's recommended temperature limits.
  3. Apply fluid applied materials in single coat in thickness as recommended by manufacturer.
  4. Fill in crevices and grooves making coating continuous and free from breaks and pin holes.
  5. Apply around joints, anchors and into chases, corners and reveals.
  6. Fluid Applied Air Barrier shall be applied around projections and penetrations. Penetrations shall also be flashed with self-adhered flashing membrane or sealed with liquid membrane.

### 3.4 PROTECTION

- A. Protect air barriers from damage during installation and while left exposed during construction. Repair damage before proceeding with subsequent construction.
- B. Air barrier and transition membranes are not designed for permanent exposure. Good practice calls for covering as soon as possible. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air barrier and at protrusions according to air barrier manufacturer's written instructions and approved tested system in accordance with ABAA air barrier testing procedures.

**END OF SECTION**



**SECTION 072730**  
**SPRAY FOAM AIR BARRIERS**

**PART 1 - GENERAL**

**1.1 RELATED DOCUMENTS**

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

**1.2 SUMMARY**

- A. Section includes spray polyurethane foam (SPF) insulation for use as an air barrier to supplement and provide continuity of the main or primary air barrier assembly, including the bridging, sealing and/or filling of perimeter of building components and systems such as, but not limited to: door and window openings, crevices, roof-wall connections, mechanical and electrical penetrations in walls, floors and roofs, window and curtain wall, mullions, beam and column enclosures, voids in walls and similar locations where the SPF will be covered.
- B. Where SPF is exposed within an attic or crawl space provide a prescriptive ignition barrier in accordance with the manufacturer's instructions, consistent with the requirements for the type of construction, and found acceptable to the authorities having jurisdiction.
- C. Related Sections:
  - 1. Section 072100 – Thermal Insulation: Rigid and batt insulation.
  - 2. Section 072700 – Weather Resistive Barrier.

**1.3 DEFINITIONS**

- A. Perm: 1 grain/h•ft<sup>2</sup>•in-Hg.

**1.4 PERFORMANCE**

- A. Air Permeability: At a minimum of 1-inch thickness, shall be considered air-impermeable based on testing in accordance with ASTM E 283.
- B. Vapor Permeability: 3.9 perms @ 1" thickness; 2.0 perms @ 2" thickness in accordance with ASTM E96, at a minimum thickness of 1.5 inches and may be used where a Class II vapor retarder is required by the applicable code.
- C. Flame Spread and Smoke Developed Rating: ASTM E 84/UL 723 :
  - 1. Flame Spread: Less than 25.
  - 2. Smoke Development: Less than 350.
- D. Thermal Resistance: ASTM C518 tested at 2" thickness full coverage: Minimum 6.0 ft<sup>2</sup>•h•xhF/Btu Aged R-Value

**1.5 SUBMITTALS**

- A. Product Data: Manufacturer's data on products to be installed.
- B. Closeout Submittals: Maintenance manuals.
- C. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Air Barriers
  - 2. LEED Credit MRc5: Provide manufacturer name, source of manufacture or final assembly for the following materials:
    - a. Air Barrier

**1.6 QUALITY ASSURANCE**

- A. Installer Qualifications: A firm with experience installing insulation systems of the type specified.
- B. Regulatory Requirements:
  - 1. Conform to applicable local building codes for fire resistance ratings and surface burning characteristics.

2. Provide certificate of compliance from authority having jurisdiction indicating approval of materials used.

### **1.7 PREINSTALLATION CONFERENCE**

- A. Conduct pre-installation conference in accordance with Section 013100.
- B. Coordinate with other building envelope trades.

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

- A. Provide materials packaged in the manufacturer's original, tightly sealed containers or unopened packages, clearly labeled with the manufacturer's name, product identification, safety information, and batch or lot numbers where appropriate. Where materials are covered by a referenced specification, the labels shall bear the specification number, type and class, as applicable.
- B. Store materials out of the weather and out of direct sunlight in locations where the temperatures are within the limits specified by the manufacturer.
- C. Protect Foam Sealant Air System materials from physical damage and from deterioration due to moisture, soiling and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing and protecting during installation.

### **1.9 PROJECT CONDITIONS**

- A. Do not apply materials when temperature or weather conditions deviate from manufacturer's recommendations. Comply with manufacturer's recommended requirements for temperatures, relative humidity, and substrate moisture content during application and curing of materials.
- B. Ensure proper ventilation in areas to receive solvent and moisture cured materials, and in enclosed spaces when installing two-component foam sealant.

### **1.10 SEQUENCING**

- A. Begin installation only after substrate work is complete and penetrations are securely anchored.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Basis of Design: Froth-Pak™ Ultra Foam Sealant, The Dow Chemical Co.
- B. Acceptable Manufacturer's: Provide Class A material from one of the following meeting requirements of basis of design product, allowing product to be left exposed at interior locations.
  1. BASF
  2. Johns Manville

### **2.2 MATERIALS**

- A. Class A Insulating Air Sealant: Sprayed-in-place two-component chemically cured polyurethane foam, meeting performance criteria.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Verify that substrate work is complete, clean and dry before beginning installation of air barrier materials.
- C. Remove loose dirt, dust and debris by using compressed air, vacuum equipment or brooming. Remove oil, grease, form release agents, laitance, and other contaminants using proper cleaning solutions. Do not wash wood or porous materials with water.



- D. Verify penetrating elements are securely fixed. Grout, tape, or calk all joint openings that exceed 1/4 inch (6 mm) in width.
- E. Remove incompatible materials which may affect bond.
- F. Install backing and damming materials for air seal if required to arrest liquid material leakage and for support.
- G. Mask, using masking tape, where necessary to avoid spillage and over coating onto adjoining surfaces; remove stains on adjacent surfaces. Remove tape as soon as possible without disturbing air seal or air seal with substrates.

### **3.2 FOAM APPLICATION**

- A. Install materials in accordance with manufacturer's instructions and acceptable to authorities having jurisdiction and the Consultant to provide required air seal.
- B. Apply sealants within recommended application temperature ranges. Consult manufacturer when sealants cannot be applied within specified ranges.
- C. In low humidity, mist area with water to aid cure of one-component sealant.
- D. Avoid overfilling restricted spaces.
- E. Use one-component foam for cracks or openings 6 mm (1/4") to 50 mm (2") wide. Use two-component foam sealant for gaps over 50 mm (2") wide, and for voids in hidden cavities.
- F. Install foam sealants in accordance with authorities having jurisdiction and all other applicable regulations pertaining to sealing materials.

### **3.3 APPLICATION AS AN AIR BARRIER**

- A. SPF may be used as an air barrier material for wall/floor and roof/wall intersections in the exterior building envelope when installed at a maximum thickness of 2 inches and width of 6-inches, unlimited length.
- B. In wall/floor intersections, the foam plastic may be applied over a fire-resistant joint without affecting the fire-resistance rating provided the foam plastic installation is limited to 2 inches by 2 inches and unlimited length.
- C. Provide continuity with the air barrier systems by sealing the following areas within the construction and construction assemblies. Please note that these areas are typical in nature and does not limit the application of these products to these noted areas but any and all details within the construction that present similar air leakage characteristics should receive similar applications. Please note the following:
  - 1. Various roof locations including penetrations of all kinds and roof to fascia junctions.
  - 2. Window head, jamb and sill areas at cavity wall.
  - 3. Various roof areas including sloped roof/wall junctions, penetrations of all kinds and roof/wall junctions.
  - 4. Junction of roof air/vapor barrier and wall air/vapor barrier.
  - 5. In cavity wall construction at roof/wall junctions, window perimeters, exhaust vents and soffits.
  - 6. Junctions at roof scuppers and other mechanical equipment located on the roof.
  - 7. Window frame at columns.
  - 8. Curtain wall systems at window and metal panels.
  - 9. At intervals in the cavity wall to achieve compartmentalization.
  - 10. Window frames, and parapets, in stucco wall construction.
  - 11. Exterior soffit overhangs in cavity wall construction.
  - 12. Wall/roof junctions at drain scuppers and other areas where mechanical equipment is located on the roof.
  - 13. All basement, corridor and parking garage penetrations made vertically through floors or horizontally through walls.
  - 14. Provide reduced air leakage into and out of building (s) by sealing gaps, leaks and holes in interior and exterior construction

- D. Ensure continuity of air and vapor seal between wall and window frame in accordance with the requirements of CSA A440.4 Windows standard.
- E. Inspect roof perimeter for air leakage paths such as the fluted deck itself, truss and structural beam penetrations above and below the top of the wall, open mortar joints, and conduit and pipe penetrations. Use smoke tester kits to identify and locate leakage.
  - 1. Use both one-component and two-component foam sealants in combination to create a continuous foamed-in-place seal between the wall and the root air/vapor barrier.
  - 2. Where deck flutes run perpendicular to the wall, foam the open flutes completely out to the fascia.
  - 3. Where closed flutes occur, punch flutes and inject foam through holes. Locate holes as close to wall as possible so that the plane of injected and cured foam within the closed flute is level with the plane of the exposed foam in the open flutes.
  - 4. Where the steel deck is parallel to the wall, fill the void with either one-component or two-component material, depending on gap size.
- F. Thermal Barrier: The insulation must be separated from the interior of the building by an approved thermal barrier of 1/2-inch thick gypsum wallboard or an equivalent 15-minute thermal barrier complying with IBC Section 2603.4.
  - 1. When installed within attics or crawl spaces, where entry is made only to service utilities, an ignition barrier must be installed on the interior of the attic or crawl space in accordance with IBC Section 2603.4.1.6.

### **3.4 PROTECTION**

- A. Upon completion of this work, remove all materials, equipment and debris from the site.
- B. Leave work area and adjacent surfaces in a condition acceptable to the Consultant.
- C. Remove excess sealant per manufacturer's recommendations.
- D. Leave installed work with sufficient protection to enable it to remain untouched until project turnover.
- E. Protect installed Foam Sealant Air System from damage due to harmful weather exposures, physical abuse, and other causes. Provide temporary coverings or enclosures where Foam Sealant Air System is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

**END OF SECTION**

**SECTION 074113**  
**METAL ROOF PANELS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Factory formed metal panel roof system complete with related gutters, downspouts, fascia panels and trim, flashings, closures, ice guards, and accessories.
  - 2. Felt underlayment.
  - 3. Vapor Barrier.
  - 4. Clips, zee purlins at open framing, anchoring devices, fasteners, and accessories required for installation of panel system.
  - 5. Manufacturer responsibility for system design and installation.

**1.2 SYSTEM REQUIREMENTS**

- A. Performance Requirements:
  - 1. Uplift Resistance: UL 580, Class 90 wind uplift resistance.
  - 2. Design and install system to accommodate thermal expansion, thermal contraction, and building movement.
- B. Roof Type 1: Assembly from roof deck up:
  - 1. Structural Metal Deck.
  - 2. Type X Roof board.
  - 3. Vapor Barrier (Water Barrier underlayment.)
  - 4. Insulation.
  - 5. High Density Roof board.
  - 6. Waterproof underlayment.
  - 7. Building Paper.
  - 8. Standing Seam Metal Roof.
- C. Equipment Roof: Metal roof, exposed fastener, over open framing.

**1.3 SUBMITTALS**

- A. General: Submit following items in accordance with Section 013300.
- B. Product Data:
  - 1. Submit product data indicating properties of materials, finishes, and performance capabilities.
  - 2. Color Charts: Submit samples of manufacturer's full range of standard colors. Submit actual color chips, not photo reproductions.
- C. Shop Drawings:
  - 1. Submit total system layout, including purlin gages, sizes, and dimensions; panel construction details, flashing, gutter, downspout, and trim details, ice guards, and methods of anchorage to accommodate design loads and thermal movement.
  - 2. Indicate roof crickets, penetrations, ridge and valley details, terminations and transitions, and change of direction pieces.
  - 3. Clearly indicate sealant locations.
  - 4. Include plan showing complete layout of each roof.
  - 5. Indicate gutter accessories including stays and stiffeners.
  - 6. Differentiate between shop and field fabricated material. Shop fabrication is preferred in all cases.
  - 7. Indicate project specific conditions including transition to adjacent systems.
  - 8. Include vapor barrier and air barrier transitions.
  - 9. Shop drawings to be approved by manufacturer including stamp of approval prior to submitting to Architect for Review.
  - 10. Attach wind load calculations associated with shop drawings approved and stamped by structural engineer of record licensed in the state of Maryland.
- D. Samples:

1. Submit 2 by 4 foot section of panel system, complete with flashings, fascia, gutter, zee purlins, and attachment devices.
  2. Upon selection of colors by Architect, submit 12 by 12 inches finish samples representing color and finish.
- E. Submit following Informational Submittals:
1. Certifications specified in Quality Assurance article.
  2. Qualification Data: Manufacturer's, engineer's, and installer's qualification data.
  3. Manufacturer's instructions.
- F. Closeout Submittals:
1. Submit under provisions of Section 017700.
  2. Warranty: Submit specified warranty.

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications:
1. Company specializing in factory fabrication of standing seam roofs.
  2. Minimum 10 years documented experience.
- B. Installer Qualifications:
1. Company specializing in installation of metal roof panel systems.
  2. Minimum 5 years documented experience in similar sized installations.
  3. Licensed or approved in writing by system manufacturer.
- C. Certifications:
1. Submit manufacturer's certification that products furnished for system, including materials and finishes meet or exceed specified requirements.

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

- A. Comply with requirements of Section 016000.
- B. Protection:
1. Protect products and accessories from damage and discoloration during transit and at Project site.
  2. Store materials on built-up surfaces.
  3. Slope panels for drainage and to protect against damage by weather and construction operations.
- C. Do not overload roof structure with stored materials. Do not permit material storage or traffic on completed roof surfaces.

#### **1.6 WARRANTY**

- A. Comply with provisions of Section 017700.
- B. Provide warranty for full replacement value of completed installation signed by manufacturer, applicator and Contractor warranting against water infiltration and defects of materials and workmanship for period of 20 years. If manufacturer will not allow installer and Contractor to sign manufacturer's warranty, append installer and Contractor's warranty to manufacturer's warranty to ensure warranty is complete in covering material, labor, and workmanship.
- C. Warrant penetrations, terminations, sealants, expansion joints, and panels.
- D. Factory Finish: Provide 10-year warranty stating finish will be:
1. Free of fading or color change in excess of 6 NBS units as measured in ASTMD2244.
  2. Will not chalk in excess of numeral rating of 7 when measured in accordance with ASTM D4214.
  3. Will not crack, peel, split, craze, delaminate, or chip.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Acceptable Double Lock Standing Seam Roof Products and Manufacturers:
1. UC-6, Firestone UNA Clad
  2. Met-Fab III, Met Fab.
  3. Prestige, Fabral.

**2.2 MATERIALS AND COMPONENTS**

- A. Structural Quality Aluminum-Zinc Alloy-Coated Steel Sheet:
  - 1. Hot-dip aluminum-zinc-coated steel sheet (Galvalume) complying with ASTM A792 with class AZ-50 coating.
  - 2. Grade 40 or to suit manufacturer's standards.
- B. Internal and External Corners, Fascia, and Fascia Panels: Same materials, gage, and finish as roof panels.
- C. Flashing, Gutters, Trim, Closure Pieces, Caps, and Accessories: Same material, gage, and where exposed, of same finish as metal panels, brake formed to required profiles.
- D. Seam-Mounted, Bar-Type Snow Guards:
  - 1. Type, sizes, configuration, and spacing as recommended by manufacturer.
  - 2. Prefabricated, continuous, noncorrosive units designed to be installed without penetrating metal roof panels, and complete with predrilled holes, clamps, or hooks for anchoring.
  - 3. Fabricate to attach to standing seam by use of set screws in clamping blocks.
  - 4. Continuous rods or bars held in place by stainless-steel clamps attached to vertical ribs of standing-seam metal roof panels.
  - 5. Finish to match standing seam roof.
- E. Expansion Joints: Same material and where exposed, finish as panels; manufacturer's standard type, of profile to suit system. Exposed fasteners same finish as panels.
- F. Metal Panel Fasteners and Clips:
  - 1. Clips:
    - a. Manufacturer's standard concealed type clip used to obtain wind uplift test results.
    - b. Material: Stainless steel.
    - c. Fabricate clips to allow thermal movement of roof panels while preventing roof panel distortion due to wind uplift forces.
  - 2. Fasteners:
    - a. Provide fasteners used to obtain wind uplift test results.
    - b. Corrosion resistant type as used for structural tests for concealed applications.
    - c. 300 - Series stainless steel with soft neoprene washers and exposed screw head color matched to roof panel where exposed. Use exposed fasteners only where absolutely necessary to attach trim. Exposed fasteners are not allowed for roof panels.
- G. Sealants and Gaskets: Manufacturer's standard type suitable for use with installation of metal roofing; non-staining; non-skinning, non-shrinking and non-sagging; ultra-violet and ozone resistant for exterior applications; color to match exposed metal.

**2.3 ACCESSORIES**

- A. Building Paper Underlayment: ASTM D226, Type II; 30 pound unperforated asphalt saturated felt.
- B. Insulation Materials:
  - 1. Polyisocyanurate Insulation:
    - a. Type: ASTM C1289, Class 1, Type II.
    - b. Zero ozone depletion potential (ODP) from blowing agent.
    - c. Long Term Thermal Resistance (LTTR) R-value based on ASTM C1303: 5.0 per inch, regardless of published values.
    - d. Total Thermal Resistance: "R" value of 30 (6.0 inches).
    - e. Facers: Both faces finished with fiberglass facers.
    - f. Manufacturer: Approved by membrane manufacturer.
    - g. 4 x 8 for bottom layer; 4 x 4 for top layer
- C. Mechanical Fasteners and Disks for Insulation Over Steel Decks:
  - 1. Appropriate for purpose intended and approved by FM.
  - 2. Length required for thickness of material.
  - 3. Fluoropolymer finish, complete with disks.
  - 4. Manufacturer as required by membrane manufacturer to be covered under warranty.

- D. Vapor Barrier: Cold applied, self-adhering membrane composed of a high density, cross laminated polyethylene film coated on one side with a layer of butyl rubber or high temperature asphalt adhesive. Provide primer when recommended by water barrier manufacturer.
  - 1. Minimum Thickness: 35-40 mil.
  - 2. Tensile Strength: ASTM D412 (Die C Modified); 250 psi.
  - 3. Membrane Elongation: ASTM D412 (Die C Modified); 250%
  - 4. Permeance (Max): ASTM E96; 0.05 Perms.
  - 5. Acceptable Products:
    - a. Blueskin PE 200 HT, Henry.
    - b. Ice and Water Shield HT, GCP Applied Technologies.
    - c. CCW MiraDRI WIP300 High Temperature, Carlisle Coatings and Waterproofing.
- E. Roof Board: Glass Fiber Faced Gypsum, ASTM C1177; Type X; FM approved; silicone treated core with filled, heat-cured coating on one side.
  - 1. 4 feet by 8 feet.
  - 2. Thickness:
    - a. 5/8 inch Type X for use over metal deck.
    - b. 1/2 inch minimum over top layer of insulation.
  - 3. Flame spread: 0.
  - 4. Acceptable Products:
    - a. Dens-Deck Prime Roof Board, Georgia-Pacific Corporation.
    - b. SecureRock High Performance Roof Boards, USG.
    - c. Or Equal; No known equals.
- F. Sealants and Gaskets: Manufacturer's standard type suitable for use with installation of metal roofing; non-staining; non-skinning, non-shrinking and non-sagging; ultra-violet and ozone resistant for exterior applications; color to match exposed metal.
- G. Fasteners:
  - 1. ASTM A153 galvanized steel or cadmium plated type for concealed applications.
  - 2. 300 series stainless steel with neoprene washers and exposed screw head color matched to adjacent panel where exposed. Use exposed fasteners only where necessary to attach ribbed metal panels.
  - 3. Provide metal-backed neoprene washers under heads of exposed fasteners bearing on weather side of panels.
- H. Touch-up Paint: As recommended by manufacturer.
- I. Bituminous Paint: Asphaltic type of composition recommended by panel manufacturer.

## 2.4 FABRICATION

- A. Building Roof Panels:
  - 1. Prefinished galvalume sheet steel.
  - 2. Type: Mechanically fastened double lock standing seam profile.
  - 3. Standing Seam Height: 2-inch.
  - 4. Size: 16 or 18 inch wide panel ribs, size as selected by Architect.
  - 5. Minimum 22 gage thickness.
  - 6. Finish: PVDF, smooth finish.
- B. Forming:
  - 1. Factory formed, uniformly dimensioned, one-piece lengths to avoid field cutting where possible.
  - 2. Intermediate horizontal panel seams not permitted.
  - 3. Fabricate panel eave with return that engages concealed eave cleat.
- C. Internal and External Corners, Fascia, and Fascia Panels:
  - 1. Profile to suit system; brake formed to required angles.
  - 2. Mitered internal corners, back braced with sheet stock, to maintain continuity of profile.
- D. Flashing, Gutters, Trim, Closure Pieces, Caps, and Accessories: Comply with standards conforming to recognized industry standard sheet metal practice.
  - 1. Configuration: As indicated on Drawings.
  - 2. Fabricate front edge 1 inch lower than back; provide higher splash guard at valleys.

- E. Fabrication of component profiles on site not permitted.
- F. Apply finish coatings prior to roll-forming.
- G. Penetrations:
  - 1. Roof Jacks: Provide two-piece roof jack consisting of unitized base plate and flexible transition boot to accommodate roof movement.
  - 2. Roof Curbs:
    - a. Fabricate large penetration and curb units as single, welded, water-tight unit consisting of a cricket and counterflashing on uphill side, and counterflashing for sides and downhill sides.
    - b. Fabricate curb of sufficient height to prevent water infiltration, and form side pans which conduct water runoff from uphill cricket.
    - c. Fabricate stainless steel cap or coping over curb. Insulate curb cavity and size cap to accommodate continuous insulation on the outside face of curb.

## 2.5 FINISH

- A. Fluoropolymer (PVDF) Coating:
  - 1. Comply with AAMA 621.
  - 2. Resin: 70 percent polyvinylidene fluoride (PVDF).
  - 3. Substrate: Cleaned and pre-treated.
  - 4. Primer:
    - a. Coating: Manufacturer's standard resin based compatible coating.
    - b. Dry Film Thickness: Minimum 0.20 mil.
  - 5. Topcoat:
    - a. Coating: PVDF.
    - b. Dry Film Thickness:
      - 1) Coil: 0.80 mil.
      - 2) Extrusion: 1.0 mil
  - 6. Color: Manufacturer's standard colors as selected by Architect.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions and proceed with work in accordance with Section 017300.

### 3.2 PREPARATION

- A. Attach roof board to structural metal deck.
- B. Vapor Barrier Underlayment:
  - 1. Install high temperature grade water barrier on clean, dry roof cover board or insulation, as detailed.
  - 2. Remove dust, dirt, and loose fasteners.
  - 3. Remove protrusions from the deck area.
  - 4. Verify substrate has no voids, damaged, or unsupported areas.
  - 5. Repair voids or unacceptable areas before installing membrane.
  - 6. Prime substrates with manufacturer's approved primer if required for proper installation of membrane over substrate.
  - 7. Install membrane in strict accordance with manufacturer's printed application procedures, precautions, and limitations.
  - 8. Start application at low points and lap membrane shingle fashion to prevent water penetration.
  - 9. Membrane Underlayment: Apply horizontally, lapping preceding layer not less than 4 inches. End lap membrane not less than 6 inches.
    - a. Maximize adhesion to substrate by brooming or rolling membrane in place after placement.
    - b. Center membrane at valleys, hips, and ridges.

- C. Insulation:
1. Place 2 layers of insulation with fasteners securing both layers; offset joints in accordance with insulation manufacturer's instructions to achieve FM wind uplift rating.
  2. Install insulation in parallel courses with end joint staggered and adjacent boards butted together with no joints greater 1/8 inch. Do not install cracked or broken boards.
  3. Cut insulation to fit neatly to perimeter blocking and protrusions through roof.
  4. Provide manufacturer's fastening pattern to meet code required wind uplift rating.
  5. Mechanical Attachment (Insulation to Metal Deck):
    - a. Provide manufacturer's fastening pattern to meet code required wind uplift rating.
    - b. Comply with FM 1-90 Approved Fastening Pattern.
    - c. Install fasteners in accordance with fastener manufacturer's recommendations. Fasteners are to have minimum penetration into structural deck recommended by fastener manufacturer and PVC manufacturer.
    - d. Use fastener tools with a depth location as recommended or supplied by fastener manufacturer to ensure proper installation.
    - e. Provide pullout tests to verify deck condition and actual pullout values. Provide data to Architect and Owner.
- D. Building Paper Underlayment:
1. Install underlayment over composite insulation with horizontal overlaps and endlaps staggered.
  2. Lay parallel to ridge line with 2-1/2 inch sidelaps and 6 inch endlaps.
  3. Start application at low point, working up deck laying plies in shingle fashion.
  4. Fasten underlayment with galvanized roofing nails spaced on 12 inch centers maximum.

### 3.3 INSTALLATION

- A. General: Install roof board, vapor barrier, insulation, waterproofing underlayment, building paper, metal roofing, and related components in accordance with Section 017300 and approved shop drawings.
- B. Metal Panel:
1. Fasten system to structure with concealed metal clips and screws at spacings required by panel manufacturer.
  2. Align, level, and plumb system within specified tolerances.
  3. Fasten clips using manufacturer's tested fastener pattern to resist design loads with screws of sufficient length to penetrate substrate.
  4. Install eave cleat and panel in manner to allow for expansion and contraction without distorting panels or distressing cleat or fasteners.
  5. Fully seat adjacent panel to achieve continuous engagement of seam joint.
  6. Install ridge assembly and clips to allow roof panels to thermally move.
  7. Protect surfaces in contact with cementitious materials and dissimilar metals with application of bituminous paint. Allow to dry prior to installation.
- C. Bar-Type Snow Guards:
1. Attach bar supports to vertical ribs of standing-seam metal roof panels with clamps and set screws. Do not use fasteners that will penetrate metal roof panels.
  2. Provide number of rows of snow guards and at locations indicated on Drawings, spaced as indicated.
- D. Install flashing, gutters, downspouts, fascias, trim, closures, caps, and accessories as indicated or required for complete weathertight installation. Install all items to allow for thermal movement without detriment to roofing system or appearance.
- E. Seal and place gaskets to prevent weather penetration.
- F. Tolerances:
1. Maximum Offset from True Alignment Between Adjacent Members Butting or In line: 1/8 inch.
  2. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.



**3.4 PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. Protect system from damage, staining, or soiling after installation. Replace components which have been scratched, dented, or otherwise showing signs of damage or improper installation.

**END OF SECTION**



**SECTION 074600**  
**FIBER CEMENT SIDING**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Sections Includes: Sheet siding, soffits, fascia, and trim composed of fiber reinforced cement boards, field finished, with manufactured trim and exposed fasteners
- B. Related Requirements: Comply with following:
  - 1. Section 072100 – Thermal Insulation: Insulation in cavity behind siding.
  - 2. Section 072700 – Air Barrier.
  - 3. Section 079200 – Joint Sealants.

**1.2 SYSTEM DESCRIPTION**

- A. Design Requirements:
  - 1. Manufacturer: Responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
  - 2. Drawings: Diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
  - 3. Attachment Considerations: Account for site peculiarities and for expansion and contraction movements to eliminate possibility of loosening, weakening and fracturing connections.
  - 4. Maximum Allowable Deflection: L/240.
  - 5. Weeps and drainage required to evacuate water from drainage plane.
- B. Materials, General: All Hardware, Fixtures, Fittings, and their components including boxes, inserts, anchors, lintels, and fasteners shall be non-corrosive material in a marine coastal atmosphere, and when in combination are not subject to electrolyze or catalytic action.
- C. Fire Resistance Requirements:
  - 1. Flame Spread: 0, Class A.
  - 2. Smoke Developed: 5, Class A.
- D. Environmental Requirements:
  - 1. Does not support fungal growth.'
  - 2. Not susceptible to attack by insects or rodents.
- E. Interface With Adjacent Systems:
  - 1. Integrate design and connections with adjacent construction.
  - 2. Accommodate allowable tolerances and deflections for structural members in installation.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit following:
  - 1. Product data for siding, trim, fasteners, and pressure seal/gasket at fasteners.
  - 2. Include sample of warranty customized for this project.
- C. Shop Drawings:
  - 1. Include details for typical connection, trim, flashing at windows and openings, joints, and unique conditions.
  - 2. Include elevations showing locations of panel joints, control joints, and panels cut or modified to suit conditions. Note that panels shall not be less than half of full size.
  - 3. Include full size details for typical connection, trim, flashing at windows and openings, joints, weeps and unique conditions including thermal breaks/ shims and air space requirements.
- D. Samples: Submit in sizes illustrating color and texture proposed for use.
- E. Informational Submittals: Submit following packaged separately from other submittals:
  - 1. Test Reports: Written results of testing specified as part of Source and Field Quality Control articles.

2. Manufacturer's instructions.

F. Closeout Submittals: Submit warranty in accordance with Section 017700.

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum five years experience.
- B. Installer Qualifications: Acceptable to manufacturer with experience on at least five projects of similar nature in past five years.

#### **1.5 FIELD SAMPLES**

- A. General: Comply with Section 014000.
- B. Sample Installation:
  1. Construct sample panel as indicated on Drawing Sheet A-053.
  2. Show jointing, corners, weeps, gutter, and typical construction techniques.
  3. Include air barrier materials and show transition conditions.
  4. Coordinate with masonry, windows and air barrier assemblies.
  5. Show transition and flashing conditions at openings such as doors, windows, and louvers.
  6. Accepted Field Sample: May remain part of completed Work.

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

- A. Conduct pre-installation conference in accordance with Section 013100.
- B. Attendees: Trades affected by fiber cement siding installation.
- C. Review requirements and coordination with related and adjacent trades including framing, sheathing, building wrap, windows, doors, louvers, and other openings and penetrations.
- D. Review detailing to ensure proper drainage and weeping of panel system.

#### **1.7 PROJECT CONDITIONS**

- A. Environmental Requirements: Comply with manufacturer's written requirements under which products can be installed.

#### **1.8 WARRANTY**

- A. Special Warranty: Prepare and submit in accordance with Section 017700.
  1. Warrant installed units to be free from defects in material and workmanship for period of five years.
  2. Include coverage against leakage, splitting, cracking, opening of joints beyond normal expansion and contraction, and failure at fasteners.
  3. Warranty: Signed by Contractor and Installer.

### **PART 2 - PRODUCTS**

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

- A. Acceptable Siding Products and Manufacturers:
  1. Hardipanel, James Hardie Building Products, Inc., Mission Viejo, CA.
  2. Cemplank, Cemplank, Inc., Blandon, PA.
  3. Swisspearl Caret SL.
- B. Acceptable Soffit Products and Manufacturers:
  1. Hardie Soffit Panel - Smooth Finish, James Hardie Building Products, Inc., Mission Viejo, CA.

#### **2.2 MATERIALS**

- A. Siding: Description: Fiber-reinforced cement based cladding panels, asbestos-free.
  1. Thickness: 5/16 inch
  2. Average Modulus of Elasticity: 750 KPSI
  3. Flexural Strength: ASTM C1185.

- a. Along Face of Sheet: 1,850 PSI
  - b. Across Face of Sheet: 2,500 PSI
- 4. Texture: Smooth.
- 5. Size: As indicated on Drawings.
- B. Soffit Panel: Fiber-reinforced cement based cladding panels, asbestos-free.
  - 1. Thickness: 1 inch.
  - 2. Texture: Smooth.
  - 3. Size: Maximum sizes to minimize joints as indicated on Drawings.
- C. Trim:
  - 1. Corners, Facia, and Closures: Internal and external corners and prefabricated shapes to match siding panels.
  - 2. Thickness: 1 inch.

## **2.3 ACCESSORIES**

- A. Sheathing: See Section 061643.
- B. Air Barrier: Refer to Section 072700.
- C. Joint Sealant: Silicone type in accordance with Section 079200.

## **2.4 FASTENERS**

- A. Galvanized or Stainless Steel Fasteners: Size and thread type to provide optimum pull-out resistance and screw-holding capacity, as identified by cladding manufacturer. Ensure compatibility with studs.

## **2.5 FINISHES**

- A. Factory Primer: Manufacturer's standard 20-year primer.
- B. Finish System: See Section 099000.

# **PART 3 - EXECUTION**

## **3.1 EXAMINATION**

- A. General: Examine conditions and proceed with work in accordance with Section 017300.
- B. Site Verification of Conditions: Confirm that framing, sheathing, air barrier, and furring are properly installed and water-tight prior to application of cladding system.

## **3.2 INSTALLATION**

- A. Siding and Soffits: Erect siding in accordance with Section 017300, ICC Evaluation Service Report NER-405, and approved Shop Drawings.
  - 1. Erect units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with adjacent surfaces.
  - 2. Install starter strip and overlap with siding. Extend bottom edge of first layer of siding beyond bottom edge of starter strip by at least 1/8 inch.
  - 3. Fasten siding along top edge and cover with next siding panel. Space and locate fasteners as directed by manufacturer.
  - 4. Ensure water-tight conditions at terminations, transitions, intersections, penetrations, and protrusions.
  - 5. Comply with manufacturer's instructions for facia and trim.
- B. Do not use panels less than half of full size manufactured panels.
  - 1. Maintain minimum 1/8 inch gap between panels and trim.
- C. Joint Sealant: Seal joints in accordance with Section 079200 at locations where siding abuts dissimilar materials, at trim, at openings, at penetrations, and at changes in plane or direction.
  - 1. Do not seal areas where water can be trapped such as underside of trim pieces or locations where flashing extends out from substrate.

**3.3 CLEANING**

- A. General: Comply with Section 017700. Clean as recommended by manufacturer. Do not use materials or methods which may damage surface or surrounding construction.

**END OF SECTION**

**SECTION 075419**  
**POLYVINYL CHLORIDE ROOFING**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes: Welded seam PVC single ply roofing over rigid roof insulation.
- B. Related Sections:
  - 1. Section 072700 – Air Barriers.
  - 2. Section 076000 – Flashing and Sheet Metal.
  - 3. Section 077000 – Roof and Wall Specialties and Accessories
- C. This Project is a registered US Green Building Council “LEED” project.
  - 1. Select locally or regionally fabricated products wherever possible.
  - 2. Provide an EPA Energy Star rated roof.

**1.2 SYSTEM DESCRIPTION**

- A. Design Requirements: Conform to NRCA - Roofing and Waterproofing Manual, except where more stringent requirements are indicated.
- B. Performance Requirements:
  - 1. Provide a system of components which will meet building code wind uplift requirements FMG wind uplift rating of 1-90 in accordance with Loss Prevention Data Sheets and Building Materials Approval Guide.
  - 2. Provide roofing system to comply with ANSI/SPRI *Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems* and ANSI/SPRI *Standard Field Test Procedure for Determining The Withdrawal Resistance of Roofing Fasteners*.
- C. Fire Resistance Requirements:
  - 1. Class A.
  - 2. Test method: ASTM E108 and UL 790.
- D. Fully Adhered Membrane on Steel Deck.
  - 1. Furnish and install completed welded seam single ply sheet roofing assembly consisting of following layers indicated from top down:
    - a. Fully adhered welded seam membrane.
    - b. Adhered Densdeck Prime roof board, 1/4 inch thick.
    - c. Two layers of Polyisocyanurate roof insulation; mechanically attached bottom layer; adhered top layer.
    - d. Vapor barrier.
    - e. Mechanically attached Densdeck, 5/8 inch thick, roof sheathing board. Tape all joints.
    - f. Structural metal deck.
- E. Use DensDeck Prime on metal studs at locations of fully adhered membrane on parapet.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit product data for each product.
- C. Shop Drawings:
  - 1. Submit details for this specific project indicating construction at all penetrations, terminations, and flashings.
  - 2. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
  - 3. Indicate vapor barrier placement and method of installation.
  - 4. Technical acceptance by roofing manufacturer.
- D. Samples for Verification: Of following products:
  - 1. 12-by-12-inch square of welded seam single ply roofing membrane, of color selected, including T-shaped side and end lap seam.
  - 2. 12-by-12-inch square of roof insulation.

3. 12-by-12-inch square of roof sheathing board.
  4. 12-inch length of metal termination bars.
  5. [12-inch length of battens.]
  6. 6 roof sheathing board and insulation fasteners of each type, length, and finish.
- E. Submit following Informational Submittals:
1. Certifications specified in Quality Assurance article.
  2. Qualification Data: Applicator's qualification data.
  3. Manufacturer's instructions; include applicable temperature ranges.
  4. Manufacturer's field reports.
- F. Closeout Submittals:
1. Submit under provisions of Section 017700.
  2. Warranty: Submit specified warranty.
- G. LEED Data: Provide special submittals conforming to Section 018113 – Sustainable Design Requirements for the following:
1. LEED Credit SSc7.2: Provide special product data for Reinforced Thermoplastic Membrane:
    - a. Energy Star Certification.
    - b. Emissivity Testing Data per ASTM E408-71.
  2. LEED Credit MRc5: Submit manufacturer name and location data for the following materials. Submit separate data for each different manufacturer used:
    - a. Roof membrane
    - b. Roof insulation

#### **1.4 QUALITY ASSURANCE**

- A. General:
1. Obtain primary roofing materials from single manufacturer. Manufacturer's name shall appear on containers.
  2. Provide secondary materials as required by manufacturer of primary materials.
  3. Manufacturer's technical representative shall visit Project site to advise applicator of procedures and precautions for installation of roofing materials and upon completion of roofing to verify warranty requirements.
- B. Owner reserves right to hire an independent roofing consultant to review submittals, procedures, and installation.
- C. Installers Qualifications:
1. Approved by manufacturer prior to execution of this Contract, with documented experience on at least 5 projects using submitted roofing system.
  2. Foreman of field crew: 5 years minimum experience with roofing system.
- D. Certifications: Manufacturer's Certification on manufacturer's letterhead:
1. Certify roof system design; penetration, transition, and perimeter details; and system specifications are appropriate and satisfactory for this particular project.
  2. Certify products proposed for use comply with referenced standards; with UL and FM attached.
  3. Certify materials ordered and supplied are compatible with each other, suited for locale and purpose intended and shipped in sufficient quantity to ensure proper timely installation.
  4. Certify roofing materials have express warranty of merchantability and fitness for particular purposes of this Project.
  5. Certify manufacturer has reviewed Project and will issue warranty upon successful completion of installation.
  6. Certify materials shipped to site meet membrane manufacturer's published performance standards and requirements of this Specification.
  7. Membrane manufacturer's approval of insulation type and method of installation.
  8. Manufacturer's approval of installer.
- E. Industry Standards: Conform to NRCA - Roofing and Waterproofing Manual, except where more stringent requirements are indicated.



**1.5 PRE-INSTALLATION CONFERENCE**

- A. Conduct pre-installation conference in accordance with Section 013100. Discuss sequence and scheduling of work and interface with other trades.
- B. Attendees: Trades affected by roofing installation.
- C. Conduct tour of roof deck and review substrate surfaces to receive roofing and flashings. Report on substrate acceptability, possible problem areas, and recommended remedies.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
  - 1. Store materials in weather protected environment, clear of ground and moisture.
  - 2. Protect membrane from cuts, tears, punctures, and abrasions.
  - 3. Protect light sensitive insulation from direct sunlight exposure.
  - 4. Store materials (except membrane) between 60 degrees F and 80 degrees F. If exposed to lower temperatures, restore to proper temperature before using.
  - 5. Stand roll materials as required by manufacturer.
  - 6. Do not store materials on roof in such concentrations as to cause deck or structural membranes to be overloaded.

**1.7 PROJECT CONDITIONS**

- A. Environmental Requirements: Proceed with roofing work only when existing and forecasted weather conditions permit work to be performed in accordance with manufacturer's requirements.
  - 1. Comply with more restrictive of following or manufacturer's written requirements under which products can be applied.
  - 2. Verify substrate is free of water, dew, and frost.
  - 3. Ambient temperature is above 0 degrees F.
  - 4. Open fires and spark producing equipment are not and will not be in application area until vapors have dissipated.
  - 5. Application areas must be well ventilated.

**1.8 SEQUENCING**

- A. Do not install greater amount of insulation than can be covered by membrane in same day. Complete with night seals and appropriate tieoffs.
- B. Sequence work to avoid traversing over completed areas in order to continue roofing operations.
- C. Manufacturer is responsible for details and dimensions not shown on Drawings and shall furnish necessary details and field measurements to ensure roofing is covered by warranty. Coordinate with responsible trades to establish, verify and maintain field dimension and Project conditions.

**1.9 WARRANTY**

- A. Comply with provisions of Section 017700 requirements.
- B. Provide no dollar limit (NDL) warranty and Non-Prorated for full replacement cost of completed installation signed by manufacturer guaranteeing against water infiltration and defects of materials and workmanship for period of 20 years from date of Substantial Completion. Warranty shall not exclude ponding water and no time limited shall be assigned for any such ponding water during the warranty period
- C. Provide material required for warranty including penetrations, terminations, flashings, sealants, roof sheathing board, expansion joints, vapor barriers, membrane, insulation, adhesives, and fasteners. Defects include (but are not limited to) unadhered membrane and flashings, moisture blisters, open seams, and weld scuffs.

**PART 2 - PRODUCTS****2.1 PRODUCTS**

- A. Reinforced Thermoplastic (PVC) Membranes:
  - 1. Standard: ASTM D4434, Classification: Type II, Grade I

2. Thickness: 0.080 inch (80 mils) minimum.
3. Size: 76 inches minimum wide by longest possible sheets as determined by Project conditions.
4. Seams: Hot-air weldable.
5. Non-wicking fiberglass or polyester reinforced membrane.
6. Membrane remains pliable, weldable, and watertight throughout its useful life, minimum of warranty period.
7. At least 33 percent of membrane above scrim reinforcing.
8. Color: White to obtain EPA Energy Star rating for low sloped roofs.
9. White Membrane Solar Reflectance Values:
  - a. Energy Star: U.S. Environmental Protection Agency certification, 78 percent or better, ASTM E903.
  - b. Emissivity: 0.90 or better when tested per ASTM E408 and ASTM C1371.
  - c. Solar Reflective Index (SRI) ASTM E1980 -- 100.
10. Products and Manufacturers:
  - a. G410 - Sika Sarnafil Roofing Systems.
  - b. 60-mil FiberTite SM, Seaman Corporation.

## 2.2 INSULATION

- A. Polyisocyanurate Insulation Materials:
  1. Polyisocyanurate Insulation:
    - a. Type: ASTM C1289, Class 1, Type II.
    - b. Zero ozone depletion potential (ODP) from blowing agent.
    - c. Long Term Thermal Resistance (LTTR) R-value based on ASTM C1303: 5.0 per inch, regardless of published values complying with PIMA Quality Mark Certification.
    - d. Thickness: 6 inches thick; R=30 in two layers with joints offset.
    - e. Facers: Both faces finished with fiberglass mat facers.
    - f. Manufacturer: Approved by membrane manufacturer.
    - g. 4 x 8 for bottom layer; 4 x 4 for top layer
  2. Roof Cover Board: 1/2 inch Dens-Deck Prime.
  3. Provide tapered polyisocyanurate insulation boards where crickets are shown or as required at edge strips and crickets for proper drainage; minimum positive roof slope 1/2 inch per foot minimum; cricket slope 1 inch per foot minimum; valleys with positive slope of 1/4 inch per foot minimum.

## 2.3 ACCESSORIES

- A. Base Flashing, Reglet, Stack Flashing, and Patching Materials:
  1. Manufacturer's standard system compatible with and matching color of roof membrane.
  2. Metal Clad Flashing: PVC clad sheet metal; SarnaClad or equal.
  3. All flashing materials approved by manufacturer and covered by warranty.
- B. Sealants, Adhesives, and Primers: As required by membrane manufacturer.
- C. Insulation Adhesive or Fasteners:
  1. Adhesive for top layer of Insulation and Cover Board:
    - a. Single component, moisture cured, low-rise polyurethane foam adhesive, dispensed from a portable, pre-pressurized container used to adhere insulation panels to the substrate as well to other insulation panels.
    - b. Insta-Stik Professional Roofing Adhesive by Dow Chemical Corporation; Joliet, IL or equal as approved by roofing manufacturer and covered under warranty.
  2. Fasteners and Plates for Attachment of Insulation to Steel Deck:
    - a. Self-drilling, self-tapping screw with low profile head. Carbon steel with fluoropolymer finish.
    - b. Corrosion resistant plates.
    - c. Meet FM Approvals 4470.
    - d. Length required for thickness of material and penetrating deck by 3/4 inch.
    - e. Designed for fastening roof insulation and cover boards to substrate.
    - f. Products: As approved by membrane manufacturer.

- D. Vapor Barrier: Torch applied type required by membrane manufacturer.
- E. Roof Board: Glass Fiber Faced Gypsum, ASTM C1177; Type X; FM approved; silicone treated core with filled, heat-cured coating on one side.
  - 1. 4 feet by 8 feet.
  - 2. Thickness:
    - a. 1/2 inch roof cover board for application over roof insulation as indicated.
    - b. 5/8 inch Dens Deck Prime Type X for use over metal deck.
    - c. Provide 5/8 inch thickness Dens-Deck Prime for parapet wall studs with fully adhered membrane on parapet.
  - 3. Flame spread: 0.
  - 4. Acceptable Product: Dens-Deck Prime Roof Board, Georgia-Pacific Corporation.
- F. Wood Nailers and Cants: Solid, preservative treated softwood.
- G. Sheet Seaming System: Manufacturer's standard hot-air welding apparatus.
- H. Walkway Mat:
  - 1. Product: SarnaTred by Sika Sarnafil.
  - 2. Roll-out, heat-welded protection mat.
  - 3. Used for walkway and protection from membrane from mechanical abuse.
  - 4. Thickness: 96-mil thick polyester reinforced PVC membrane with textured surface.
  - 5. Fabricate walkway for dimensional stability and durability.
  - 6. Provide color contrasting light gray top surface.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Ensure wood blocking has been placed at proper elevations around perimeter of each roof level and at penetrations.
- C. Verify work which penetrates deck has been completed.
- D. Verify deck is clean and smooth, free of depressions, waves or projections, properly sloped to drains. Verify flutes of steel deck are clean and dry.
- E. Verify roof openings and penetrating elements through roof are solidly set, and cant strips, wood blocking, nailing strips, and reglets are in place. Verify deck is properly supported and secured.
- F. Do not apply roofing materials to damp, frozen, dirty, dusty, or other deck surface conditions which are unacceptable to manufacturer and applicator.

#### **3.2 PREPARATION**

- A. Clean substrate of dust, debris, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.
- C. Wood Nailers:
  - 1. Install wood nailers, underlayment, membrane, and accessories in accordance with FM, UL, and manufacturer's requirements.
  - 2. Install at roof perimeter and at base of penetrations over 18 inches long or in diameter.
  - 3. Thickness equal to insulation or greater where indicated.
- D. Gypsum Roof Board:
  - 1. Install gypsum roof board on metal deck with long dimension parallel to flutes. Stagger end joints.
  - 2. Cut roof board cleanly and accurately at roof breaks and protrusions to provide smooth surface.
  - 3. Adhere insulation to metal deck over pool atmosphere areas.

4. Mechanically fasten roof board to metal deck in non-pool atmosphere areas with fastener type and penetration in accordance with FMG requirements.
5. Comply with applicable provisions of NRCA Specification INS-S (Pages 689-692).
- E. Vapor Retarder:
  1. Apply vapor barrier over roof sheathing board in accordance with roof manufacturer's requirements.
  2. Lap and seal joints; offset endlaps.
  3. Extend vapor retarder under blocking.
  4. Lap vertically applied flashing over vapor retarder at wall construction to provide continuity of vapor retarder envelope.
  5. Provide transition of vapor barrier to air barrier for continuity.
- F. Insulation and Roof Cover Board:
  1. Place 2 layers of insulation with fasteners for bottom layer and adhesives for upper layers. Offset joints in accordance with insulation manufacturer's instructions to achieve FMG wind uplift rating.
  2. Install insulation in parallel courses with end joint staggered and adjacent boards butted together with no joints greater 1/8 inch. Do not install cracked or broken boards.
  3. Cut insulation to fit neatly to perimeter blocking and protrusions through roof.
  4. Lay tapered boards to provide minimum positive roof slope 1/2 inch per foot; cricket slope 1 inch per foot minimum; valleys with positive slope of 1/4 inch per foot minimum and other areas where structure has not provided slope to drains, gutters or roof edge.
  5. Provide 1/4 inch roof cover board over insulation with joints offset from insulation joints.
  6. Mechanical Attachment (Bottom Layer of Insulation to Metal Deck):
    - a. Provide manufacturer's fastening pattern to meet code required wind uplift rating.
    - b. Comply with FM 1-90 Approved Fastening Pattern.
    - c. Install fasteners in accordance with fastener manufacturer's recommendations. Fasteners are to have minimum penetration into structural deck recommended by fastener manufacturer and PVC manufacturer.
    - d. Use fastener tools with a depth location as recommended or supplied by fastener manufacturer to ensure proper installation.
    - e. Provide pullout tests to verify deck condition and actual pullout values. Provide data to Architect and Owner.
  7. Low Rise Foam Adhesive (Upper Layers of Insulation and Roof Cover Board):
    - a. Apply using manufacturer's approved equipment over properly installed and prepared substrates at rate according to manufacturer's requirements meeting FM wind uplift requirements and covered by roof membrane manufacturer's warranty.
    - b. Primer may be required prior to application of adhesive if excessive dirt or dust remains on substrate.
    - c. Apply adhesive in a smooth, even coating with no gaps, globs, puddles or similar inconsistencies. Only areas that can be made completely watertight in the same day's operations shall be coated.
    - d. For multiple layers of insulation spray adhesive over the base layer once fully secured and follow procedures above for attachment of each insulation layer.
    - e. Installation Guidelines:
      - 1) Adhesive must be applied as a continuous layer.
      - 2) Follow manufacturer's installation and environmental requirements.
      - 3) Adhesive shall not be applied to wet or damp surfaces.

### 3.3 INSTALLATION

- A. General:
  1. Do not apply roofing materials to surfaces which are unacceptable to manufacturer and installer.
  2. Do not install greater amount of insulation than can be covered by membrane in same day.
  3. Sequence work to avoid traversing over completed areas in order to continue roofing operations.

4. Do not expose materials vulnerable to water or sun damage in quantities greater than can be weatherproofed during same day.
  5. Install night cut-off sealer and appropriate tieoffs at end of day's work.
- B. Fully Adhered Membrane:
1. Install sheet according to ASTM D5036.
  2. Unroll membrane over prepared substrate in approximate final position. Allow to relax.
  3. Cut sheets to maximum length possible to minimize seams.
  4. Overlap sheets at edges and ends as required by manufacturer.
  5. Apply bonding adhesive to substrate and underside of sheet as required by manufacturer. Do not apply adhesive with seam welding area.
  6. Apply membrane and expansion joint materials to isolate roof into areas as required. Seal roofing membrane sheet to joint flange, apply sealant to edge or seam.
  7. Weld seams with hot air welder of type approved by manufacturer. Prime seams if necessary to achieve proper weld. Ensure that fastener plates and seams are located in accordance with manufacturer's requirements.
  8. Overlap joints on sloped substrate in direction of drainage.
  9. Eliminate fishmouths, wrinkles, bubbles, or other type voids.
  10. Heat weld membrane to adjoining surfaces.
- C. Flashing and Accessories:
1. Install base flashing, terminations, and fascia trim as indicated and required by manufacturer. Use longest pieces practicable.
  2. Install base flashing up vertical surfaces minimum 8 inches above cant top or edge strip unless otherwise noted. Fasten top of base flashing with devices and at locations and frequency as recommended by manufacturer.
  3. Coordinate installation of base flashing with Section 076000 - Flashing and Sheet Metal and Section 077000 - Roof Specialties and Accessories.
  4. Bond base flashing to substrate in accordance with manufacturer's requirements to obtain water tight bond.
  5. Take measures to ensure base flashing is not ridging where there is change of direction.
  6. Fasten top of base flashing under metal counterflashing at manufacturer's recommended spacing.
  7. Flash penetrations passing through membrane.
- D. Walkway Mats:
1. Install walkway products in locations indicated.
  2. Heat weld to substrate according to roofing system manufacturer's written instructions.

### **3.4 FIELD QUALITY CONTROL**

- A. Request site attendance of roofing manufacturer technical representative during various stages of installation of roof assembly.
- B. Manufacturer's Field Services:
1. Comply with requirements of Section 014000.
  2. Provide inspection to ascertain specified material and workmanship quality is being maintained and for purposes of warranty verification.
  3. Perform final inspection after roof completion.
  4. Field Reports: Submit summary of Project site observations, instructions and monitoring activities.
- C. Site Tests and Inspections:
1. Inspect cured seams with probe or similar device to ensure welds are consistent.
  2. Correct defective seams.
- D. Correct identified defects or irregularities.

### **3.5 CLEANING**

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage membrane, flashing, or surrounding construction.

**3.6 PROTECTION**

- A. Provide temporary roof protection in accordance with Section 017300 requirements and as recommended by manufacturer in areas of anticipated roof traffic during remainder of construction.
- B. Prevent traversing roof without temporary protection.
- C. Remove protection when no longer needed.

**END OF SECTION**

**SECTION 076000**  
**FLASHING AND SHEET METAL**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes: Shop and field formed sheet metal flashing, counterflashing, reglets, and associated trim.
- B. Related Sections:
  - 1. Section 042000 – Unit Masonry.
  - 2. Section 074113 – Metal Roof Panels: Gutters and downspouts.
  - 3. Section 075419 – Polyvinyl Chloride Roofing.
  - 4. Section 077000 – Roof Specialties and Accessories: Preformed aluminum copings.
- C. This Project is a registered US Green Building Council “LEED” project.
  - 1. Select materials to maximize use of recycled steel.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 REFERENCES**

- A. Reference Standards: Comply with applicable provisions for design, materials, fabrication, and installation of component parts of Sheet Metal and Air Conditioning Contractors National Association (SMACNA), 6th Edition.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  - 1. Submit product data for reglets, and prefinished metal.
  - 2. Submit product data indicating performance and physical characteristics of sheet metal products, including thickness.
  - 3. Submit color charts for finish indicating manufacturer's colors available for selection.
- C. Shop Drawings:
  - 1. Indicate typical layout including dimensions, configuration, locations, interface with adjacent systems, clearances, tolerances, frequency of attachment, and fabrication details.
  - 2. Submit detail drawings of transitions, intersections, connections, and terminations including end dams.
- D. Submit following Informational Submittals:
  - 1. Certifications specified in Quality Assurance article.
  - 2. Qualification Data: Fabricator's qualification data.
- E. Closeout Submittals:
  - 1. Warranty: Submit specified product warranty in accordance with Section 017700.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Steel.
  - 2. LEED Credit MRc4: Provide documentation certifying the percentage of recycled content of metal materials based on material cost per weight for the following materials:
    - a. Steel.
  - 3. LEED Credit MRc5: Provide manufacturer name and location data for the following materials:
    - a. Steel.

**1.4 QUALITY ASSURANCE**

- A. Fabricator's Qualifications: Company specializing in sheet metal flashing work with 3 years documented experience in similar size and type of installations.
- B. Certifications: Submit fabricator's certification that products furnished for Project meet or exceed specified requirements.

**1.5 DELIVERY, STORAGE AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Stack pre-formed material to prevent twisting, bending, and abrasions, and to provide ventilation.
- C. Prevent contact with materials which may cause discoloration or staining.

**1.6 WARRANTY**

- A. Provide warranties in accordance with Section 017700.
- B. Warrant installed system to be free of leaks and free from defects in materials and workmanship for 2 years from date of Substantial Completion of project.
- C. Warrant factory applied fluorocarbon finish to be free of cracks, splits, crazing, chipping, peeling, and color fading for 10 years from date of Substantial Completion of Project.

**PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Prefinished Galvanized Steel Sheet:
  - 1. General: Zinc coating, hot dip galvanized, flattened sheets, chemically treated.
  - 2. Commercial Quality: ASTM A653, G90
  - 3. Lock-Forming Quality: ASTM A653, G90
  - 4. Thickness: As recommended in Architectural Sheet Metal Manual for intended purposes.
  - 5. Finish:
    - a. Thermo-cured inhibitive primer 0.2 mil minimum dry film thickness and thermo-cured fluorocarbon coating containing not less than 70 percent resin (Kynar 500 or Hylar 5000), 1.0 mil minimum dry film thickness conforming to AA C12C42R1x.
    - b. Comply with AAMA 621; fluorosurfactant complying formulation.
    - c. Color: Custom color selected by Architect.
- B. Prefinished Aluminum:
  - 1. ASTM B209, with pre-finished fluorocarbon coating and wash cut primer on back side.
  - 2. Texture: Smooth finish.
  - 3. Finish:
    - a. Thermo-cured inhibitive primer 0.2 mil minimum dry film thickness and thermo-cured fluorocarbon coating containing not less than 70 percent resin (Kynar 500 or Hylar 5000), 1.0 mil minimum dry film thickness conforming to AA C12C42R1x.
    - b. Comply with AAMA 620; fluorosurfactant complying formulation.
    - c. Color: Selected by Architect from manufacturer's full range of colors.
  - 4. Thickness: 0.040 inch minimum.
- C. 0.019 inch thick Stainless Steel Masonry Flashings: Refer to Section 042000.
- D. Flexible Flashing: Refer to Transition Membrane specified in Section 072700.

**2.2 ACCESSORIES**

- A. Reglets:
  - 1. General:
    - a. Units of type and profile as indicated, formed to provide secure interlocking of separate reglet and counterflashing pieces.
    - b. Compatible with flashing and roofing materials.



2. Surface-Mounted:
  - a. Manufactured surface applied reglet with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.
  - b. Acceptable Product: Equivalent to Type SM, Fry Reglet Corporation.
3. Masonry:
  - a. Manufactured reglet with offset top flange for embedment in masonry mortar joint.
  - b. Acceptable Product: Equivalent to Type MA, Fry Reglet Corporation.
4. Manufacturers:
  - a. Fry Reglet Corporation.
  - b. W. P. Hickman Company.
  - c. Keystone Flashing Company.
- B. Fasteners:
  1. Materials: AISI Series 300 for stainless steel.
  2. Nails: Use annular ring shank type, No. 12 gage or larger to suit application, of sufficient length to penetrate backing material at least 7/8 inch.
  3. Screws and Bolts: Sufficient size and length to sustain imposed stresses.
- C. Solder Materials:
  1. Flux: Type as recommended by sheet material manufacturer; not detrimental to base material.
  2. Solder: ASTM B32, 50 percent tin/50 percent lead for plain copper, galvanized steel.
- D. Asphalt Mastic: SSPC-Paint 12, solvent-type asphalt mastic, containing no asbestos fibers, compounded for 15 mil dry film thickness per coat. Do not apply asphalt where silicone is used.
- E. Butyl Tape Sealant:
  1. Comply with ASTM C 1281:
  2. Preformed, butyl-based elastomeric tape sealant with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces.
  3. With or without spacer rod as recommended in writing by tape manufacturers for application indicated.
  4. Packaged on rolls with a release paper backing.
- F. Sealants:
  1. Silicone—General Purpose sealant specified in Section 079200.
  2. Do not apply silicone where asphalt is used.
  3. Color as selected by Architect from full range of manufacturer's standard colors.
- G. Splash Block: Manufacturer's standard fiberglass.

## **2.3 FABRICATION**

- A. General:
  1. Shop fabricate components to maximum extent possible to minimize site fabrication.
  2. Fabricate to allow for adjustments in field for proper anchoring and joining.
  3. Form sections true to shape, accurate in size, square, free from distortion and defects.
  4. Fabricate cleats and starter strips of same material as sheet, interlockable with sheet.
  5. Fabricate corners from one piece with minimum 18 inch long legs; solder for rigidity; seal with sealant.
  6. Solder
    - a. Solder and seal metal joints except those indicated or required to be expansive type joints.
    - b. After soldering, remove flux. Wipe and wash solder joints clean.
- B. Seams:
  1. Provide following seam types unless noted or detailed otherwise.
  2. Flat: Drive cleat.
  3. Corner: Double corner.
  4. Standing: Double lock standing.
- C. Sheet Metal Thickness/Mass:
  1. Flashing: In accordance with SMACNA Chapter 4.

- D. Flashing and Counter Flashing:
  - 1. Fabricate as indicated on Drawings and in accordance with SMACNA Architectural Sheet Metal Manual, Chapter 4.
  - 2. Hem exposed flashings on underside 1/2 inch; miter and seam corners.
  - 3. Fabricate vertical faces with bottom edge formed outward 1/4 inch and hemmed to form drip.
  - 4. Fabricate flashings to allow toe to extend minimum 2 inches over wall surfaces.

## **2.4 FINISHES**

- A. Fluorocarbon Coating:
  - 1. Comply with AAMA 621 and 620 as applicable.
  - 2. Resin: 70 percent polyvinylidene fluoride (PVDF).
  - 3. Substrate: Cleaned and pre-treated.
  - 4. Primer:
    - a. Coating: Manufacturer's standard resin based compatible coating.
    - b. Dry Film Thickness: Minimum 0.20 mil.
  - 5. Topcoat:
    - a. Coating: PVDF.
    - b. Dry Film Thickness:
      - 1) Coil: 0.80 mil.
      - 2) Extrusion: 1.0 mil
  - 6. Color: Custom color as selected by Architect.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, cant strips and reglets in place, and nailing strips located.
- C. Verify membrane termination and base flashings are in place, sealed, and secure.

### **3.2 PREPARATION**

- A. Field measure site conditions prior to fabricating work.
- B. Install edge strips and cleats before starting installation.
- C. Install surface mounted reglets true to lines and levels. Seal top of reglets with sealant.

### **3.3 INSTALLATION**

- A. General:
  - 1. Install metal work in accordance with SMACNA.
  - 2. Install units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.
  - 3. Apply asphalt mastic on metal surfaces of units in contact with cementitious materials and dissimilar metals.
  - 4. Fit flashings tight in place. Make corners square, surfaces true and straight in planes, and lines accurate to profiles.
  - 5. Miter, lap seam and close corner joints with solder. Seal seams and joints watertight.
  - 6. Install expansion joints at frequency recommended by SMACNA. Do not fasten seams such that movement is restricted.
  - 7. Coordinate with installation of roofing system and roof accessories.
- B. Flashing
  - 1. Insert flashings into reglets to form tight fit. Secure in place with wedges at maximum 12 inches on center. Seal flashings into reglets with sealant.
  - 2. Secure flashings in place using concealed fasteners. Use exposed fasteners only in locations approved by Architect.

## C. Counterflashing and Reglets:

1. Fabricate counterflashings and reglets as 2 piece assemblies to permit installation of counterflashing after base flashings are in place.
2. Fabricate reglets of same metal and gage as counterflashings.
3. Install continuous preformed butyl sealant tape behind fastener line of surface mounted reglets in accordance with manufacturer's written instructions. Apply silicone weather seal at top edge. Prevent contact between different sealing materials.
4. Overlap composition base flashing 4 inches minimum.
5. Install bottom edge tight against base flashing.
6. Lap seam vertical joints 3 inches minimum and apply sealant.

**3.4 CLEANING**

- A. Upon completion of each area of soldering, carefully remove flux and other residue from surfaces. Neutralize acid flux by washing with washing soda solution, and then flushing clear water rinse. Use special care to neutralize and clean crevices.

**END OF SECTION**



**SECTION 077000**  
**ROOF SPECIALTIES AND ACCESSORIES**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Roof curbs.
  - 2. Pipe portals.
  - 3. Roof Hatch.
- B. Related Sections:
  - 1. Section 074113 – Metal Roof Panels.
  - 2. Section 075419 – Polyvinyl Chloride Roofing.
  - 3. Section 076000 – Flashing and Sheet Metal: Counterflashing.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  - 1. Submit manufacturer's descriptive literature and product specifications for each product.
  - 2. Indicate profiles, anchorages, jointing details, flashings, and accessories.
  - 3. Include color charts for finish indicating manufacturer's standard colors available for selection.
- C. Shop Drawings:
  - 1. Indicate typical layout including dimensions, configuration, locations, interface with adjacent systems, clearances, tolerances, frequency of attachment, and fabrication details.
  - 2. Submit detail drawings of transitions, intersections, and connections.
  - 3. Submit detail drawings of accessory components not included in manufacturer's product data.
- D. Submit following Informational Submittals:
  - 1. Certifications specified in Quality Assurance article.
  - 2. Manufacturer's instructions.
- E. Closeout Submittals:
  - 1. Submit under provisions of Section 017700.
  - 2. Warranty: Submit specified warranty in accordance with Section 017700.

**1.3 QUALITY ASSURANCE**

- A. Single Source Responsibility: Furnish each product from one manufacturer, unless otherwise acceptable to Architect.
- B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum 5 years documented experience.
- C. Certifications:
  - 1. Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.
  - 2. Submit Contractor's and installer's certification that products are installed in accordance with Contract Documents.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.

**1.5 WARRANTY**

- A. Comply with provisions of Section 017700.

- B. Warrant installed roof curbs, roof expansion joint covers, fascias, and copings to be free from defects in material and workmanship for time period to match roof system specified in Section 075419.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Structural Quality Galvanized Steel: ASTM A653, with galvanized G90 coating.
- B. Aluminum Extrusions: ASTM B221, alloy and tempered as required by manufacturer for intended use but not less than strength and durability qualities of alloy 5005-H15.
- C. Aluminum Sheet: ASTM B209, alloy and tempered as required by manufacturer for intended use but not less than strength and durability qualities of alloy 6063-T5.
- D. Preservative Pressure Treated Wood: Softwood lumber treated in accordance with AWPA C2 for above grade use.
- E. Bituminous Paint: SSPC Paint 12
- F. Roofing Cement: ASTM D4586, Type I.

### **2.2 CURBS AND SUPPORTS**

- A. Coordinate with mechanical and electrical rooftop requirements.
- B. Acceptable Roof Curb Products and Manufacturers:
  - 1. Model RPC-1 by Roof Products, Inc.
  - 2. Style PC-5 by The Pate Company.
  - 3. Model RC-4A by Roof Products and Systems Corporation.
  - 4. Model TC-1 by ThyCurb.
- C. Acceptable Equipment Support Rail Products and Manufacturers:
  - 1. Model RPES-1 by Roof Products, Inc.
  - 2. Style ES-5, The Pate Company.
  - 3. Model ER-4A, Roof Products and Systems Corporation.
  - 4. Model TEMS-1, ThyCurb.
- D. Acceptable Pipe Roller Support Products and Manufacturers:
  - 1. Style PRS-5, The Pate Company.
  - 2. Model PMP, Roof Products and Systems Corporation
  - 3. Model TEMS-1 with pipe roller assembly, ThyCurb.
- E. General:
  - 1. Sheet Metal: Structural quality galvanized steel, thickness to suit spans and imposed loads with corner seams mitered and welded. Curbs shall be air sealed.
  - 2. Insulation: 3 pcf density, rigid glass fiber board, minimum 1-1/2 inches thick.
  - 3. Wood Nailers and Grounds: Preservative pressure treated wood, minimum 2 inch cross sectional dimensions.
  - 4. Height: 12 inches minimum above elevation of finished roofing, except where indicated otherwise. Coordinate with tapered insulation thickness.
  - 5. Built-in Cant: 3 inch wide; 45 degree angle.
  - 6. Fabricate with bottom edge of built-in cant raised above roof deck surface to accommodate roof deck insulation.
  - 7. Curbs:
    - a. Size: Accommodate curb-mounted equipment and pipe portals; coordinate requirements prior to fabrication.
  - 8. Pipe Rollers Supports:
    - a. Provide with single channel atop curb to support threaded rods holding pipe rollers.
    - b. Size pipe rollers to accommodate pipe sizes.

**2.3 PIPE PORTALS**

- A. Pipe Portals for Low-Sloped Roofs:
  - 1. Manufacturer's standard ABS and EPDM rubber boots to accommodate 3/8 through 6 inch diameter pipe.
  - 2. Furnish complete with stainless steel hose clamps.
  - 3. Accommodate quantity and size of piping to pass through portal caps.
  - 4. Fabricate for mounting atop manufacturer's curb.
  - 5. Acceptable Products and Manufacturers:
    - a. RPVP-3 Vertical Pipe Curb and Cover, Roof Products, Inc.
    - b. PCA-5, Pipe Curb Assembly, The Pate Company.
    - c. Pipe Portal System, Roof Products and Systems Corporation.
    - d. TP-2 Piping Cover, ThyCurb.

**2.4 HATCHES**

- A. Acceptable Hatch Manufacturers:
  - 1. Basis of Design: Bilco Company, Type E
  - 2. Babcock-Davis Hatchways, Inc.,
  - 3. Nystrom, Brooklyn Park, MN
  - 4. Milcor, Inc.
- B. Description:
  - 1. Access Hatch, Single Leaf, Nominal Size: 3'-0" x 3'-0".
  - 2. Structural quality aluminum.
  - 3. Aluminum:
    - a. Curb and cover: 0.090 inch minimum thickness.
    - b. Liner: 0.063 inch minimum thickness.
  - 4. Liner Insulation: 1 inch thick glass fiber, expanded polystyrene, or expanded polyurethane.
  - 5. Curb Insulation: 1 inch fiber board.
  - 6. Access Hatch Hardware: Manufacturer's standard hinges, compression spring operators, positive snap latch with turn handles inside and out, padlock hasp inside, automatic hold-open device with vinyl covered grip handle, and neoprene draft seal.
  - 7. Curb:
    - a. 12 inch high minimum with 3-1/2 inch flange equipped with clearances holes for securing to deck.
    - b. Equip with integral metal cap flashing, same gage as curb.
    - c. Fully cover and protect cover insulation with metal liner.
    - d. Fabricate with top of curb level and bottom to accommodate roof slope.
  - 8. Construct cover with 3 inch beaded flange, welded.
  - 9. Fabrication:
    - a. Fabricate free of visual distortions and defects.
    - b. Weld corners and joints.
    - c. Provide for removal of condensation occurring within components or assembly.
    - d. Fit components for weathertight assembly.
  - 10. Finishes:
    - a. Aluminum: Manufacturer's standard acrylic lacquered protective coating over mill finish.
    - b. Field paint finish.
    - c. Hardware: Stainless steel.
- C. Safety Post:
  - 1. Provide telescoping tubular safety post fabricated from hot-dipped galvanized steel.
  - 2. Acceptable product: Bilco LadderUP Safety Post Model LU-2.
- D. Safety Rail:
  - 1. Provide manufacturer's OSHA compliant (CFR 1910.23) fall protection safety rail system that surrounds hatch and is connected directly to hatch. Do not compromise hatch operation or weathertight integrity.
  - 2. No attachment to roof is allowed.
  - 3. Meet railing safety requirements of authorities having jurisdiction.

4. Fabricate posts and railing from fiber reinforced polymer.
  5. Provide self-closing, self-latching gate.
- E. Signage: Provide permanent signage with minimum 1 inch high letters at top surface and underside surface of hatch covers to read: KEEP HATCH CLOSED WHEN NOT IN USE. Comply with CABO/ANSI A117.1 requirements.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Verify that deck, curbs, blocking, cants, roof membrane, and base flashing are in place and positioned correctly.
- C. Coping:
  1. Verify that coverage onto vertical finish materials is sufficient to result to watertight installation.
  2. Verify membrane terminations and base flashings are in place, sealed, and secure.

#### **3.2 INSTALLATION**

- A. General:
  1. Install units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.
  2. Apply bituminous paint on metal surfaces of units in contact with cementitious materials and dissimilar metals.
  3. Securely anchor roof accessories to supporting substrates with appropriate type fasteners.
  4. Coordinate with installation of roofing system and related flashings.
- B. Curbs: Integrate curbs with adjacent roofing systems, base flashings, and counter flashings to create watertight conditions.
- C. Hatches: Secure flanges to deck by bolting or welding.

#### **3.3 ADJUSTING**

- A. Adjust hatch covers and hardware for smooth, uniform operation.

#### **3.4 CLEANING**

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish or surrounding construction.
- B. Clean primer, adhesive, flashing cements, and other products from surfaces, exposed sheet metal and bellows.

#### **3.5 PROTECTION**

- A. Protect finished work in accordance with Section 017300.

**END OF SECTION**



**SECTION 078400  
FIRESTOPPING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Firestop devices and systems tested in accordance with ASTM E814 (ANSI/UL 1479) and listed in UL Fire Resistance Directory.
  - 2. Fire resistant construction joints.
  - 3. Dynamic partition head details.
  - 4. Edge of slab and curtain wall conditions.
  - 5. Penetrations through fire-rated floors, walls, and shafts.
  - 6. Duct and damper firestops.
  - 7. Intumescent wraps and pads at receptacle boxes and recessed items within fire rated walls.
- B. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select adhesives and sealants meeting LEED requirements.
  - 2. Select materials to maximize use of recycled materials.
  - 3. Select locally or regionally fabricated products wherever possible.
- C. Related Sections:
  - 1. Section 017329 - Cutting and Patching; Repair of openings with original materials.
  - 2. Section 092900 - Gypsum Board
  - 3. Division 21 – Fire Suppression.
  - 4. Division 22 – Plumbing.
  - 5. Division 23 – Heating, Ventilating, and Air Conditioning.
  - 6. Division 26 – Electrical.

**1.2 SYSTEM DESCRIPTION**

- A. General: Make firestop and smoke seal assembly selections that comply with UL Fire Resistance Directory, authority having jurisdiction, and applicable codes for:
  - 1. Materials, fabrication, and installation of firestops and smoke seals.
  - 2. Fire containment.
  - 3. Fire resistant construction joints.
  - 4. Dynamic partition head details.
  - 5. Edge of slab and curtain wall conditions.
  - 6. Penetrations through fire-rated floors, walls, and shafts.
  - 7. Duct and damper firestops.
  - 8. Intumescent wraps and pads at receptacle boxes and recessed items within fire rated walls.
  - 9. Coordinate with mechanical and electrical to provide single manufacturer for all firestopping materials.
- B. Firestop Voids and Openings in Following Locations:
  - 1. Duct, cable, cable tray, conduit, piping, and other penetrations through floor slabs (except on-grade slabs) and through fire rated walls and partitions.
  - 2. Penetrations of vertical shafts, pipe chases, elevator shafts, and utility shafts.
  - 3. Openings between floor slab edges and exterior walls, including glass and aluminum curtain walls.
  - 4. Openings, gaps, and cracks at abutting fire rated assemblies and components, such as wall-to-wall and wall-to-floor including overhead floor and roof decks.
  - 5. Blank openings into or through fire rated floors and walls.
  - 6. Other locations indicated or scheduled.
- C. Design Requirements:
  - 1. Firestop materials used to fill floor openings in which smallest dimension is 4 inches shall support same loads that floor was designed to support. If equal floor loading capacity cannot be obtained with firestop material, provide fire rated permanent covering to support loads and traffic, capable of being removed to allow access.

2. Insulated Piping and Duct Penetrations: Install firestop systems intended for use with type of insulation on penetrating item.
  - a. Install firestop systems intended for use with type of insulation on penetrating item.
  - b. If compatible firestop system is unavailable, remove insulation at contact area with firestop material.
  - c. Coordinate with trades who installed insulation to ensure proper re-sealing of cut edges of insulation.
3. Provide Products that Do Not Deteriorate when Exposed to Following Conditions:
  - a. Plumbing and Wet-Pipe Sprinkler Systems: Moisture-resistant through-penetration firestop.
  - b. Exposed to View:
    - 1) Flame-spread value of less than 25 and smoke-developed value of less than 450, ASTM E84.
    - 2) Compatible with applied finishes.
- D. F and T Rating Requirements: Conform to F and T ratings, ASTM E 814 (ANSI/UL 1479).
  1. Comply with applicable codes and authority having jurisdiction.
  2. F Ratings: Equal to fire resistance rating of assembly being penetrated but not less than one hour.
  3. T Ratings: Equal to F ratings or as required by authority having jurisdiction.
- E. Provide W-rated fire/smoke stop system (Class 1) for wet areas.
- F. Testing Requirements:
  1. Utilize systems and materials tested and approved by UL or other nationally recognized independent testing agency acceptable to authorities having jurisdiction.
  2. Determine fire ratings in accordance with ASTM E814 (ANSI/UL 1479) for through penetration firestops, ASTM E119 (UL263) for fire rated assemblies, and as required by applicable codes and authority having jurisdiction.
- G. Large openings may be closed with same type construction as adjacent floor, roof, and wall assembly.
- H. Sealing around penetrations fire rated assemblies without approved firestop system is not permitted. Methods and materials not permitted include but are not limited to:
  1. Joint compound at gypsum board assemblies.
  2. Mortar at masonry and concrete assemblies.
  3. Use of joint sealants.
- I. Whenever finished firestop materials are scheduled to receive finish paint or other coatings, test compatibility of firestop materials with coatings to be applied.

### 1.3 SUBMITTALS

- A. General: Submit in accordance with Section 013300.
- B. Submit deferred submittal to authorities having jurisdiction for each firestopping system and condition for this project. Obtain approval from authority having jurisdiction.
- C. Submit manufacturer's certification stating:
  1. Each penetration of fire rated walls and floor, partition heads, and edge of slabs will be firestopped with a firestopping system tested by UL or other recognized testing agency for substrate and penetrating item.
  2. Authorities having jurisdiction have approved firestopping systems for this project.
  3. Products and Classifications Schedule:
    - a. Provide tabular form schedule for firestops, fire containment, and fire resistant construction joints.
    - b. Schedule to identify:
      - 1) Construction penetrated including fire resistance rating.
      - 2) Penetrating item.
      - 3) Products and manufacturers included in each system.
      - 4) Form material used.
      - 5) Firestop classification and description from UL or other nationally recognized independent testing agency acceptable to authority having jurisdiction.

- 6) Fire containment and fire resistant construction joint description.
- 7) F, T, and W ratings.
- c. Update schedule periodically to include addition and changes.
- D. Informational Submittals: Submit following:
  1. Test Reports: Copy of UL or other acceptable testing agency report illustrating each system and device as tested and approved.
  2. List of generic descriptions and product names and manufacturers included in each system including form material, containment system, gang assemblies, means of controlling size of annular space, and sealer, topcoat, or intumescent materials.
  3. Certifications specified in this section.
  4. Qualification Data: Manufacturer's and installer's qualification data.
  5. Manufacturer's field reports.
- E. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
    - a. Fireproofing.
  2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
    - a. Fireproofing.
  3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
    - a. Fireproofing.
  4. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
    - a. Adhesives and sealants.

#### 1.4 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum five years experience.
- B. Installer Qualifications:
  1. Company specializing in installation of firestopping specified with experience on at least five projects of similar nature in past three years.
  2. Licensed, trained, and approved by manufacturer of firestop materials.
- C. Installer Responsibility: Select firestop, fire containment, and fire resistant construction joint products from those indicated for each penetration.
  1. Obtain approval of authorities having jurisdiction for selected methods.
  2. Submit proposed methods along with proof of acceptance by authority having jurisdiction.
- D. Regulatory Requirements: Ensure firestop, fire containment, and construction joint components comply with applicable portions of local, state, and federal codes, laws, and ordinances for flame spread and smoke developed indices.
- E. Certifications:
  1. Manufacturer's certification that products furnished for Project meet or exceed specified requirements.
  2. Contractor's and installer's certification that products are installed in accordance with Contract Documents, based on inspection and testing specified as part of Field Quality Control.
  3. Certificates of compliance from authority having jurisdiction indicating approval of firestops, fire containments, and construction joints.
  4. Certificate of inspection and acceptance by authority having jurisdiction of firestops, fire containments, and construction joints.

**1.5 PRE-INSTALLATION CONFERENCE**

- A. Conduct pre-installation conference in accordance with Section 013100.
- B. Agenda: Include discussion and agreement upon acceptable:
  - 1. Product and classification schedule.
  - 2. Test firestop materials to confirm compatibility with adjacent materials and chemicals and solvents with which they may come into contact during construction.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with Section 016000.
  - 1. Packing, Shipping, Handling, and Unloading: Deliver materials in manufacturer's unopened containers with manufacturers name, product identification, lot number, UL labels or labels of other nationally recognized independent testing agency, and mixing and installation instructions.
  - 2. Storage and Protection: Store materials to prevent deterioration and damage due to moisture, temperature change, and contamination.

**1.7 PROJECT CONDITIONS**

- A. Environmental Requirements:
  - 1. Comply with manufacturer's temperature and humidity limitations before, during, and after installation.
  - 2. Comply with ventilation requirements specified in Section 015000.

**1.8 SEQUENCING**

- A. Sequence Work properly with adjacent work to allow unobstructed access to all areas needing firestops and smoke seals..
  - 1. Identify penetrations and openings requiring firestops, smoke seals, fire containments, and construction joints.
  - 2. Schedule installation of firestopping after completion of work involving penetrating items, but prior to covering, concealing, and eliminating access to penetrations.
  - 3. Coordinate with work of other trades
- B. Inspection: Request inspection of firestops by authority having jurisdiction and testing consultant before concealment.
  - 1. Sequence work to permit installation to be inspected and approved prior to being concealed.
  - 2. Ensure that subsequent openings and penetrations are reported, properly firestopped, and inspected.

**PART 2 - PRODUCTS****2.1 FIRESTOPPING DEVICE AND SYSTEM MANUFACTURERS**

- A. Acceptable Manufacturers:
  - 1. Hilti, Corp., Tulsa, OK.
  - 2. 3M Fire Protection Products, St. Paul, MN.
  - 3. Specified Technologies Inc., Sommerville, NJ.
- B. Acceptable Edge of Slab Manufacturers:
  - 1. Specified Technologies Inc., Sommerville, NJ.
  - 2. 3M Fire Protection Products, St. Paul, MN.
  - 3. Owens Corning Thermafiber.

**2.2 SYSTEMS**

- A. Description:
  - 1. Sealant, putty, intumescent materials, or mortar material.
  - 2. Non-corrosive and compatible with synthetic cable jackets.
  - 3. Flame spread less than 25 when tested according to ASTM E84.
  - 4. Mixes: If mixing is required, mix components as instructed by manufacturer.

5. Top of partition assemblies: Combination of safing insulation and flexible fire rated smoke seal tested and approved for dynamic movement complying with ANSI/UL2079 Test for Fire Resistance of Building Joint Systems (cyclic test).
  6. Provide typical dynamic assemblies complying with ASTM E1399 and UL 2079 for fire rated assemblies exposed to movement such as: head of wall joints; floor to floor joints; floor to wall joints; wall to wall joints; undersides of metal decks; tops of walls; undersides of composite decks; and fire-rated control, construction, and expansion joints.
- B. Systems: Comply with code for firestopping systems for each condition encountered.
- C. Safing Insulation, Foil Faced:
1. General: Mineral fiber composition, foil faced.
  2. Classification:
    - a. ASTM C612, Class 1 or 2.
    - b. ASTM C665: Type III, Class A.
  3. Density and Thickness: Manufacturers recommended to achieve indicated fire rating.
  4. Combustion Characteristics: ASTM E136, noncombustible.
  5. Fire rating: ASTM E84, flame spread 25 or less and smoke development 10 or less.
  6. Acceptable Products:
    - a. Owens Corning Thermafiber: Thermafiber Safing Insulation.
    - b. Roxul SAFE, Roxul.
- D. Accessories: Provide accessories required by manufacturer, UL or other testing agency, and classification for specific application.
1. Retaining Collars: . Firestop Devices: Factory-assembled steel collars lined with intumescent material sized to fit specific outside diameter of penetrating item
  2. Wrap Strips: Single component intumescent elastomeric strips faced on both sides with a plastic film
  3. Composite Sheet: Intumescent material sandwiched between a galvanized steel sheet and steel wire mesh protected with aluminum foil.
  4. Cast-In-Place Firestop Device: Single component molded firestop device installed on forms prior to concrete placement with totally encapsulated, tamper-proof integral firestop system and smoke sealing gasket.
  5. Fire-Rated HVAC Retaining Angles: Steel angle system with integral intumescent firestop gasket for use on steel HVAC ducts.
  6. Firestop Plugs: Re-enterable, foam rubber plug impregnated with intumescent material for use in blank openings and cable sleeves.
  7. Fire-Rated T Rating Collar Device: Louvered steel collar system with synthetic aluminized polymer coolant wrap installed on metallic pipes where T Ratings are required by applicable building code requirements.
  8. Fire-Rated Cable Grommet: Molded two-piece grommet made from plenum grade polymer with a foam inner core for sealing individual cable penetrations up to 0.27 in. (7 mm) diameter.
  9. Firestop Pillows: Re-enterable, non-curing, mineral fiber core encapsulated with an intumescent coating contained in a flame retardant poly bag.
  10. Fire Rated Cable Pathways: Re-enterable device modules comprised of steel raceway with intumescent foam pads allowing 0 to 100 percent cable fill. These device modules shall be engineered such that two or more devices may be ganged together for greater capacity.
  11. Steel wire, wire mesh, clips, sleeves, anchoring devices, primers, and other materials.
  12. Metal Sheets and Shapes: Size and thickness as required by fire resistant system.
  13. Fibrous Fire Safing Adhesive: As instructed by manufacturer.
  14. Fibrous Fire Safing Clips/Fasteners: As instructed by manufacturer.
  15. Sealant Primers: As instructed by manufacturer.
  16. Sealant Damming Materials:
    - a. Non-combustible.
    - b. Chemically compatible with sealant.
    - c. Mineral fiberboard, mineral fiber matting, or fibrous fire safing.
  17. Cleaning Solvents: As instructed by manufacturer.
  18. Labels:

- a. Provide label for each firestop condition.
- b. Type information in non-fading ink on 20 pound (minimum) paper.
- c. Include following information on each label:
  - 1) Manufacturer's name.
  - 2) Product name.
  - 3) Product type (sealant, putty, mortar, or other generic material description).
  - 4) F-Rating.
  - 5) W Rating.
  - 6) T-Rating. State when not required for condition.
  - 7) Testing and listing agency filing number, such as UL System number.
- E. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that comply with VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
  1. Current requirement refers to the date on which the materials are installed in the building.
  2. SCAQMD Rule #1168 is referenced in Section 018113 that was current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
  3. Interior refers to all building construction that is inside of the exterior weatherproofing material.

### 2.3 CURTAIN WALL FIRE STOPPING SYSTEMS

- A. Fire Retardant Sealants and Insulation:
  1. Insulation: Approved semi-rigid curtain wall insulation and firesafing materials.
  2. Smoke seal:
    - a. Single component, asbestos free, neutral cure.
    - b. Rated and approved for dynamic edge of slab conditions.
  3. Provide assembly that is tested and listed for use with glass and aluminum curtain wall system.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Verify that permanent penetration items have been installed and that temporary penetrating items have been removed.
- C. Verify that supports have been installed on both sides of penetrated construction as required by UL classifications.
- D. Inspect and verify that surfaces and condition of openings have no defects that could interfere with installation and performance of firestop materials.
- E. Verify sleeves installed under plumbing, mechanical, and electrical work are properly installed.

### 3.2 PREPARATION

- A. Clean surfaces of opening substrates free of dirt, oil, grease, loose and harmful materials which may adversely affect bond of materials to surfaces in accordance with manufacturers recommendations.
- B. Test surfaces which have been previously painted, sealed, and treated with other coatings and compounds to ensure compatibility with materials and proper bond capability.
- C. Remove incompatible coatings and materials which may affect firestop bond with surrounding surfaces.
- D. Mask and protect adjacent surfaces from damage.
- E. Prime surfaces as instructed by manufacturer.

**3.3 FIRESTOPPING INSTALLATION**

- A. General: Install in accordance with Section 017300, manufacturer's details, applicable codes, UL or other testing agency classification requirements, and approved schedule and shop drawings.
  - 1. Fire resistant systems without UL or other testing agency classification requirements shall be approved by authorities having jurisdiction before installation.
  - 2. Install firestopping material in manner required to achieve F rating, W rating, and T rating required by UL classification, applicable codes, and authorities having jurisdiction.
  - 3. Install firestopping material with sufficient pressure to ensure uniform density and texture, and to ensure proper filling and sealing of openings to create smoke seal.
  - 4. Install forms and supports to arrest liquid and flowable material leakage and retain materials in openings.
  - 5. Remove form materials after firestopping material has cured unless materials used are permitted or required to remain according to test classifications.
- B. Through Penetration Firestopping Systems: Comply with classification design requirements. Separate cables not in conduit and maintain required separation of penetrating items from edges of openings and from each other.
  - 1. Tool and trowel exposed surfaces to smooth finish, flush with surrounding surfaces unless otherwise required by test classification.
  - 2. Remove excess firestop material promptly as work progresses.
- C. Through Penetration Firestopping:
  - 1. Securely attach device frames to supporting construction.
  - 2. Assembly component parts to ensure proper contact and sealing of gaps and openings around penetrating items.
- D. Curtain Wall Fire Containment, Foil Faced Siding Insulation:
  - 1. Fill voids between curtain wall and edge of slabs at floors and roofs in accordance with manufacturer's instructions. Do not leave voids in siding.
  - 2. Tape and seal tears and cuts in facing.
  - 3. Seal joints with manufacturer's recommended sealant.
  - 4. Provide flexible fire rated smoke seal tested and approved for dynamic movement.
  - 5. Create fire rated assembly with UL design number.
- E. Fire Resistant Construction Joints:
  - 1. Provide fire resistant systems to match fire rating of adjacent construction.
  - 2. Provide fire resistant systems at following locations:
    - a. Voids and gaps in fire rated construction, including control joints and gap at top of fire-rated CMU walls.
    - b. Fire rated partition and metal deck flutes.
    - c. Changes in partition material.
    - d. Floor joints not requiring expansion joint.
    - e. Other locations indicated and required by applicable codes.

**3.4 FIELD QUALITY CONTROL**

- A. Site Inspections: Comply with Section 014000.
- B. Inspection: Owner will engage and pay for services of independent testing consultant to perform quality control inspection.
- C. Do not conceal firestops, fire containments, and fire resistant construction joints prior to required inspection.
- D. Notify authority having jurisdiction and designated inspectors of work released for inspection.
- E. Labels:
  - 1. Provide label for each firestop/smoke seal condition.
  - 2. Securely fasten label immediately adjacent to firestopping condition to allow authorities having jurisdiction and owner's inspection agency to readily identify and confirm system.
  - 3. Wall partitions are required to have protected openings or penetrations permanently identified with signs or stenciling. Such identification shall be located in accessible concealed floor, floor-ceiling or *attic* spaces:

- a. Be located within 15 feet of the end of each wall and at intervals not exceeding 30 feet measured horizontally along the wall partition and
  - b. Include lettering not less than 3 inches height with a minimum 3/4 inch stroke in a contrasting color incorporating the suggested wording. **"Fire and/or smoke barrier-protect all openings"** or similar wording.
- F. Inspection Requirements:
  1. Visually examine firestopping, fire containments, and fire resistant construction joints to verify compliance with Contract Documents.
  2. Examine firestopping, fire containments, and fire resistant construction joints for proper installation, adhesion, and curing appropriate for each material.
  3. Submit written inspection report including following information:
    - a. Identify construction penetrated including fire resistance rating.
    - b. Identify penetrating item.
    - c. Identify products and manufacturers included in each system.
    - d. Identify form material used.
    - e. Firestop classification and description from UL, FM, Warnock Hersey or other independent testing agency.
    - f. Fire containment and fire resistant construction joint description.
    - g. F, T, and W rating.
    - h. State whether firestop, fire containment, and fire resistant construction joint is or is not in full compliance with testing agency classification, description and manufacturer's requirements. If variations occur confirm acceptance of variation by manufacturer and authority having jurisdiction.
- G. Re-examine firestopping, fire containments, and fire resistant construction joints immediately prior to concealment by other construction to ensure no damage has occurred since initial inspection.
- H. Correct unacceptable firestopping, fire containments, and fire resistant construction joints, and provide additional inspection, to verify compliance with this Section, at no additional cost to Owner.

### 3.5 REPAIRS AND MODIFICATIONS

- A. Identify damaged and re-entered seals requiring repair and modification.
- B. Remove loose and damaged materials.
- C. If penetrating items are to be added, remove enough material to permit penetration by new elements, being careful not to damage balance of seal.
- D. Repair holes, cracks, and damage in accordance with manufacturer's instructions to ensure complete smoke seal.
- E. Use only materials approved by manufacturer of original seal as suitable for repair.

### 3.6 CLEANING

- A. General: Comply with Section 017700.
  1. Clean as instructed by manufacturer. Do not use materials or methods which may damage firestop or surrounding construction.
  2. Remove stains and correct damage to adjacent surfaces.

### 3.7 PROTECTION

- A. Protect finished work in accordance with Section 017300.
- B. Protect material subject to traffic from damage.

**END OF SECTION**



**SECTION 079200**  
**JOINT SEALANTS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Related Sections:
  - 1. Section 072700 – Air Barrier.
  - 2. Section 076000 - Flashing and Sheet Metal.
  - 3. Section 078400 - Firestopping.
  - 4. Section 084113 - Aluminum Entrances and Storefronts.
  - 5. Section 092900 - Gypsum Board.
  - 6. Section 093000 - Tiling.
- B. This Project is a registered US Green Building Council “LEED” project.
  - 1. Adhesives used within building shall comply with VOC limits of South Coast Air Quality Management District Rule #1168.

**1.2 DEFINITIONS**

- A. Use definitions in ASTM C717.
- B. Non-Bleeding: Not capable of exuding liquid chemical components of sealant.
- C. Non-Staining: Not capable of discoloring joint substrate.
- D. Sealant System: Sealant, sealant backing, and primer intended for use in particular condition.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  - 1. Submit product data and product specifications for each product.
  - 2. Include data to indicate chemical characteristics, performance criteria, limitations, substrate preparation, installation requirements, and curing requirements.
  - 3. Include information for accessories and other required components.
  - 4. Include color charts indicating manufacturer's full color range available of each sealant type for Architect's initial selection.
- C. Samples: Submit four 1/4 inch diameter by 2 inch long samples illustrating sealant colors for each product exposed to view.
- D. Submit following Informational Submittals:
  - 1. Test Reports: Submit written results of testing specified as part of Source and Field Quality Control articles.
  - 2. Certifications specified in Quality Assurance article.
  - 3. Qualification Data: Manufacturer's and installer's qualification data.
  - 4. Manufacturer's instructions. Include requirements for surface preparation, priming, joint size ratios, adhesion testing, and perimeter conditions requiring special attention.
  - 5. Manufacturer's field reports.
- E. Closeout Submittals:
  - 1. Submit under provisions of Section 017700.
  - 2. Warranty: Submit specified warranty.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
    - a. Adhesives and sealants.

**1.4 QUALITY ASSURANCE**

- A. Single Source Responsibility:
  - 1. Provide products for each sealant system from one manufacturer for entire Project, unless otherwise acceptable to Architect.
  - 2. Provide products from a single manufacturer to ensure material compatibility where different sealant materials come in direct contact with each other.
  - 3. Provide each sealant system as complete unit, including accessory items necessary for proper function.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum 5 years experience.
- C. Applicator Qualifications: Acceptable to manufacturer, specializing in applying sealants, with experience on at least 5 projects of similar nature in past 5 years.
- D. Certifications:
  - 1. Manufacturer's Certification that Products:
    - a. Furnished for Project meet or exceed specified requirements.
    - b. Assembled for each joint are compatible with each other and with joint substrates under conditions of service and application.
    - c. Are suitable for the indicated use.
  - 2. Manufacturer's certification that sealants, primers, and cleaners, comply with local regulations controlling the use of volatile organic compounds.
  - 3. Contractor's and installer's certification that products are installed in accordance with Contract Documents, based on inspection and testing specified as part of Field Quality Control.

**1.5 FIELD SAMPLES**

- A. General: Comply with provisions of Section 014000.
- B. Preconstruction Field Sample:
  - 1. Construct sealant joint mock-up 5 feet long for elastomeric joint sealants specified in this Section.
  - 2. Position at location directed by Architect.
  - 3. Construct minimum of 3 weeks prior to scheduled installation.
  - 4. Perform "field hand-pull adhesion test" described under Field Quality Control, one per each different substrate on the building exterior envelope. Pull Test to be performed 21 days after installation of field sample.

**1.6 MOCK-UPS**

- A. General: Comply with provisions of Section 014000.
- B. Visual Mock-Up:
  - 1. Seal joints in mock-ups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section.
  - 2. Visual mock-up may be used for preconstruction field test mock-up of assemblies specified in other Sections.
  - 3. Construct minimum of 3 weeks prior to scheduled installation.
  - 4. Demonstrate:
    - a. Selections made from submittal samples.
    - b. Sealant color and aesthetic effects.
    - c. Material and installation qualities.
    - d. Placement of two-stage seals, including sequence and curing procedures.
  - 5. Perform "field hand-pull adhesion test" described under Field Quality Control, one per each different substrate on the building exterior envelope. Pull Test to be performed 21 days after installation of field sample.

**1.7 PRE-INSTALLATION CONFERENCE**

- A. Conduct pre-installation conference in accordance with Section 013100.
- B. Convene pre-installation conference 3 weeks prior to commencing work of this Section.

- C. Conference Purpose and Agenda:
  - 1. Visit Project site to analyze site conditions, and inspect surfaces and joints to be sealed in order that recommendations may be made should adverse conditions exist.
  - 2. Review mock-up and field sample.
  - 3. Discuss following items:
    - a. Substrate conditions.
    - b. Preparatory work.
    - c. Weather conditions under which work will be done.
    - d. Anticipated frequency and extent of joint movement.
    - e. Joint design.
    - f. Sealant installation procedures.

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

- A. Comply with requirements of Section 016000.
- B. Deliver materials to site in unopened containers and bundles with labels indicating:
  - 1. Manufacturer's name.
  - 2. Product name and designation.
  - 3. Color.
  - 4. Expiration period for use.
  - 5. Working life.
  - 6. Curing time.
  - 7. Mixing instructions for multi-component materials.
- C. Storage and Protection:
  - 1. Store products within manufacturer's required temperature and humidity ranges.
  - 2. Prior to use, condition products within manufacturer's required temperature range, humidity range, and time period.

#### **1.9 PROJECT CONDITIONS**

- A. Environmental Requirements:
  - 1. Apply sealant when the following are within manufacturer's limits during and for 24 hours after sealant installation:
    - 2. Ambient and surface temperatures.
    - 3. Relative humidity.
    - 4. Do not apply sealants to wet or frozen surfaces.
  - 5. Comply with manufacturer's requirements regarding application of sealants in vicinity of curing sealants of a different material.

#### **1.10 SEQUENCING**

- A. Coordinate work with Sections referencing this Section.
- B. Coordinate installation of sealants with substrates to which they are applied.

#### **1.11 WARRANTY**

- A. Provide warranties under provisions of Section 017700.
- B. Manufacturer's Warranty:
  - 1. Silicone Sealants: Standard twenty (20) year Warranty against failure of material.
  - 2. Other Sealants: Standard five (5) year Warranty against failure of material.
- C. Special Installer's Warranty: Installer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
  - 1. Warranty Period: Two (2) years from date of Substantial Completion.
- D. Include coverage for installed sealants and accessories which:
  - 1. Fail to achieve air tight seal.
  - 2. Fail to achieve watertight seal.
  - 3. Exhibit loss of adhesion.
  - 4. Exhibit loss of cohesion.

5. Do not cure.

## **PART 2 - PRODUCTS**

### **2.1 MATERIALS**

- A. Acrylic Latex (Designation AL):
  1. Description:
    - a. ASTM C834.
    - b. Non-sag; non-staining; non-bleeding.
    - c. Joint movement range without cohesive/adhesive failure: Plus 7.5 percent to minus 7.5 percent of joint width.
    - d. Color: As selected by Architect from manufacturer's full color range.
  2. Acceptable Products:
    - a. AC-20, Pecora Corporation.
    - b. Sonolac, Sonneborn Division of BASF Building Systems, Shakopee, MN..
    - c. Acrylic Latex Tremflex 834, Tremco, Inc.
- B. Silicone—General Purpose (Designation S-GP):
  1. Description:
    - a. ASTM C920:
      - 1) Type: S
      - 2) Grade: NS
      - 3) Class: 50
      - 4) Uses: NT, M, G, A, O
    - b. Single component, neutral curing, non-staining, non-bleeding silicone sealant.
    - c. Medium modulus silicone for metal to metal and metal to adjacent substrates; Low modulus silicone for all other locations.
    - d. Joint movement range without cohesive/adhesive failure: Plus 50 percent to minus 50 percent of joint width.
    - e. Color: Selected by Architect from manufacturer's full color range.
    - f. Acceptable Medium Modulus Products:
      - 1) 795, Dow Corning.
      - 2) Silpruf, General Electric.
      - 3) 864, Pecora.
      - 4) Spectrem 2, Tremco.
    - g. Acceptable Low Modulus Products (Expansion joints at brick, storefront to masonry):
      - 1) 790, Dow Corning.
      - 2) 890, Pecora.
      - 3) Spectrem 1, Tremco.
- C. Silicone—Sanitary (Designation S-S):
  1. Description:
    - a. ASTM C920:
      - 1) Type: S
      - 2) Grade: NS
      - 3) Class: 25
      - 4) Uses: NT, M, G, A, O
    - b. Neutral or acid curing, non-staining, non-bleeding, fungicide-containing.
    - c. Color: White.
  2. Acceptable Products:
    - a. 786 Mildew-Resistant Silicone Sealant, The Dow Chemical Company.
    - b. Sanitary 1700, General Electric Silicones.
    - c. Tremsil 200 Sanitary, Tremco
    - d. 863 or 898, Pecora Corporation.
- D. Urethane—Traffic-Bearing (Designation U-TB):
  1. Description:
    - a. ASTM C920:
      - 1) Type: M

- 2) Grade: P or NS
  - 3) Class: 25
  - 4) Uses: T, M, O
- b. Chemical curing, non-staining, non-bleeding.
- c. Joint movement range without cohesive/adhesive failure: Plus 12-1/2 percent to minus 12-1/2 percent of joint width minimum
- d. Shore A hardness: 40 minimum, when tested in accordance with ASTM C661.
- e. Color: Selected by Architect from manufacturer's full color range.
2. Acceptable Products:
  - a. Dynatred, Pecora Corporation.
  - b. Sikaflex 2c/SL, Sika Corporation.
  - c. SL 2 Sealant, Sonneborn Division of BASF Building Systems, Shakopee, MN.
  - d. THC 901, Tremco, Inc.
- E. Control Joint Sealant (Designation CJS):
  1. Two-component, self-leveling 100% solids polyurea control joint filler.
  2. Resistant to diesel spills.
  3. Location: Control Joints.
  4. Acceptable Product: TF-100 Control Joint Filler, Sonneborn Division of BASF Building Systems, Shakopee, MN.
- F. Repair Sealant (Designation RS):
  1. Two component 100% solids polyurea crack repair compound.
  2. Location: Saw-cut joints.
  3. Acceptable Product: TF-100CR, Sonneborn Division of BASF Building Systems, Shakopee, MN.
- G. Insulating Air Foam Sealant (Designation U-IA):
  1. Description: Insulating polyurethane foam air sealant for metal deck flutes and for sealing gaps, cracks, and holes through openings, joints, and connections between building components.
  2. Provide material manufactured to stop air and vapor leakage to exterior assemblies.
  3. Provide high yield, quick curing materials.
  4. Provide in containers with gun applicator and nozzle lengths as necessary to reach voids.
  5. Basis of Design Product:
    - a. Dow Froth Pak, Dow Chemical Company.
    - b. Or Equal.

## 2.2 ACCESSORIES

- A. Joint Cleaner:
  1. Chemical cleaners required by sealant manufacturer for substrates encountered, compatible with sealant backing bond breaker materials.
  2. Free of substances capable of staining, corroding, or harming:
    - a. Joint substrates.
    - b. Adjacent nonporous surfaces.
    - c. Sealant.
    - d. Sealant backing.
  3. Formulated to promote optimum adhesion of sealants to joint substrates.
- B. Primer:
  1. Dyed coating material required by sealant manufacturer for enhancing sealant adhesion to joint substrates.
  2. Non-staining to joint substrate beyond the substrate surface.
  3. Required for use unless not required by results of:
    - a. "Manufacturer's sealant-substrate compatibility and adhesion test" described under Source Quality Control.
    - b. "Field hand-pull adhesion test" under Field Quality Control.
  4. Use primers that comply with VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113.

- C. Sealant Backing Bond Breaker Rod:
  - 1. Non-staining material.
  - 2. Compatible and non-adhering to sealant when tested in accordance with ASTM C1087.
  - 3. Compatible with sealant, joint substrates, primers, and other sealant backing bond breakers.
  - 4. Sealant manufacturer approved.
  - 5. Sized and shaped to provide optimum performance and backing to sealant.
  - 6. Preformed, compressible, resilient, non-staining, non-outgassing, non-waxing, non-extruding, cylinder-shaped plastic foam rods compliant with ASTM D1056.
  - 7. Open Cell Polyurethane: Use not permitted unless required by sealant manufacturer.
  - 8. Closed Cell Polyethylene:
    - a. Non-absorbent to liquid water.
    - b. Use in wall and ceiling joints unless otherwise required by sealant manufacturer.
  - 9. Reticulated Polymeric: Sof®-Rod, Nomaco, Inc.
  - 10. Unless otherwise required by sealant manufacturer, oversize rod to be larger than joint width by following minimum amounts:
    - a. Open Cell Polyethylene: 50 percent.
    - b. Closed Cell Polyethylene: 33 percent.
    - c. Reticulated Polymeric: 25 percent.
- D. Elastomeric Tubing Joint Filler:
  - 1. Neoprene, butyl, EPDM, or silicone tubing compliant with ASTM D1056.
  - 2. Shore A hardness of 70.
  - 3. Compatible with sealant, joint substrates, primers, and other sealant backing bond breakers.
  - 4. Use in pavement joints, unless otherwise required by sealant manufacturer.
  - 5. Use sealant backing bond breaker tape to separate sealant from rod.
  - 6. Unless otherwise required by sealant manufacturer, oversize rod to be larger than joint width by 25 percent the following minimum amounts:
- E. Sealant Backing Bond Breaker Tape:
  - 1. Pressure sensitive polyethylene tape or tetrafluorethylene self-adhesive tape required by sealant manufacturer to suit application.
  - 2. Minimum Thickness of 11 mils.
- F. Masking Tape: Non-staining, non-absorbent material compatible with sealants and surfaces adjacent to joints.
- G. Tooling Liquids: Non-staining material approved by manufacturer to reduce adhesion of sealant to joint finishing tools.
- H. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that comply with VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
  - 1. Current requirement refers to the date on which the materials are installed in the building.
  - 2. SCAQMD Rule #1168 referenced in Section 018113 that was current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
  - 3. Interior refers to all building construction that is inside of the exterior weatherproofing material.

## 2.3 MIXES

- A. Comply with manufacturer's instructions.
- B. Mix thoroughly with mechanical mixer without mixing air into sealants.
- C. Continue mixing until sealant is uniform in color and free from streaks of unmixed materials.

## 2.4 SOURCE QUALITY CONTROL

- A. General: Comply with requirements of Section 014000.
- B. Tests:
  - 1. Coordinate testing of sealant compatibility and adhesion to:
    - a. Sealant backing materials.

- b. Entrance system specified in Section 084113.
- c. Tile specified in Section 093000.
- 2. Manufacturer's Sealant-Substrate Compatibility and Adhesion Test:
  - a. Test Methods:
    - 1) Determine if priming and other specific joint preparation techniques are not required to obtain rapid, optimum adhesion of sealants to joint substrates.
    - 2) Comply with ASTM C510, ASTM C794, and ASTM C1087.
  - b. Submit not less than 9 pieces 3 by 5 inches in size of each type of material, including joint substrates, shims, sealant backing, and miscellaneous materials.
  - c. Schedule sufficient time for testing and analysis of results to prevent delay in the progress of the Work.
  - d. Investigate sealant material's failing compatibility/adhesion tests and obtain manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
  - e. Include in Test Report, Manufacturer's:
    - 1) Interpretation of test results regarding sealant performance.
    - 2) Primers and substrate preparation required to achieve adhesion.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Ensure that concrete and masonry have cured minimum of 28 days.
- C. Verify that sealant backing is compatible with sealant.
- D. Verify that substrate surface:
  - 1. Is within manufacturer's moisture content range.
  - 2. Complies with manufacturer's cleanliness and surface preparation requirements.
- E. Joint Width:
  - 1. Verify joints are greater than minimum widths required by manufacturer.
  - 2. If joints are narrower than minimum required widths, widen narrow joints to indicated width.
  - 3. Do not place sealant in joints narrower than manufacturer's required minimum.

#### **3.2 PREPARATION**

- A. Prepare, clean, and prime joints in accordance with manufacturer's instructions.
- B. Remove loose materials and matter which might impair adhesion of primer and sealant to substrate.
- C. Remove form release agents, laitance, and chemical retarders, which might impair adhesion of primer and sealant to concrete and masonry surfaces.
- D. Comply with ASTM C1193.
- E. Protect elements adjoining and surrounding work of this Section from damage and disfiguration.
- F. Priming:
  - 1. Prime joint substrates unless priming is not required by:
    - a. "Manufacturer's sealant-substrate compatibility and adhesion test" described in Source Quality Control article.
    - b. "Field hand-pull adhesion test" described in Field Quality Control article.
  - 2. Apply primer to substrate areas where joint sealant is to adhere.
  - 3. Comply with manufacturer's sequencing requirements for joint priming and sealant backing bond breaker rod installation to assure required primer application coverage and rate without placement of primer on backer rod surface to be in contact with sealant and avoid three-sided sealant adhesion.
  - 4. Do not allow spillage and migration of primer onto surfaces not to receive primer.
  - 5. Install sealant to primed substrates after primer has cured.
- G. Masking Tape:

1. Use masking tape to prevent contact of primer and sealant with adjoining surfaces that would be permanently stained or damaged by:
  - a. Contact with primer and sealant.
  - b. Cleaning methods used to remove primer and sealant smears.
2. Place continuously along joint edges.
3. Apply masking tape so it does not shift in position after placement.

### 3.3 APPLICATION

#### A. General:

1. Comply with requirements of Section 017300.
2. Comply with results and recommendations from:
  - a. "Manufacturer's compatibility and adhesion test" described in Source Quality Control Article.
  - b. "Field hand-pull adhesion test" described in Field Quality Control article.
3. Provide compatible sealant system between dissimilar assemblies and adjacent construction.
4. Seal locations necessary to create and secure continuous air, water, and vapor enclosure even though Contract Documents may not indicate all locations; do not seal weep holes.
5. Seal to prevent migration of water, vapor, and air through joints.
6. Comply with manufacturer's required application temperature and relative humidity ranges. Consult manufacturer when sealant cannot be applied within these ranges.

#### B. Sealant Backing Bond Breaker:

1. Measure joint dimensions and size materials to achieve manufacturer-required width-to-depth ratios.
2. Install to achieve sealant depth and sealant contact depth no greater than distance required by manufacturer for sealant material, joint width, and joint movement range.
3. Install using blunt instrument to avoid puncturing.
4. Do not:
  - a. Twist, puncture, and tear material.
  - b. Leave gaps between ends of material pieces.
  - c. Stretch or compress material along its length.
  - d. Stretch or compress tape material along its width.
5. Install to provide optimum joint profile and in manner to provide not less than 1/4 inch sealant depth when tooled.
6. Install tape where insufficient joint depth makes use of rod not possible. Match tape width to joint width to prevent three-side adhesion. Do not wrap tape onto sides of the joint.
7. Replace backing bond breaker materials which have become wet with dry materials prior to sealant application.

#### C. Sealant:

1. Install sealants at same time as installation of backing bond breaker materials.
2. Do not exceed manufacturer's required:
  - a. Material shelf life.
  - b. Material working life.
  - c. Installation time after mixing.
3. Comply with manufacturer's requirements for applying different sealant materials in direct contact with each other.
4. Use gun nozzle size to suit joint size and sealant material.
5. Install sealant with pressure-operated devices to form uniform continuous bead.
6. Use sufficient pressure to fill voids and joints full.
7. Install to adhere to both sides of joint.
8. Install to not adhere to back of joint; provide sealant backing.
9. Install sealant free of air pockets and embedded matter.
10. Recess sealant 1/8 inch from surface of pavements and horizontal surfaces.

#### D. Sealant Tooling:

1. Comply with manufacturer's tooling method requirements.
2. Tool sealant within manufacturer's tooling time limits.



3. Tooling liquids:
    - a. Comply with manufacturer's requirements regarding use.
    - b. Do not use when not permitted by manufacturer.
    - c. Do not allow tooling liquids to come in contact with surfaces receiving sealant.
  4. Produce smooth exposed surface.
  5. Tool Sealant to be Free of:
    - a. Air pockets and voids.
    - b. Embedded impurities.
    - c. Surface ridges, sags, and indentations.
  6. Achieve full sealant contact and adhesion with substrate.
  7. Form a concave tooled joint shape indicated in Section A of Figure 5 of ASTM C1193, unless otherwise indicated.
  8. Remove excess sealant from surfaces adjacent to joint.
  9. Allow acrylic latex sealant to achieve firm skin before paint is applied.
- E. Masking Tape:
1. Remove immediately after tooling sealant and before sealant skin forms.
  2. Remove without disturbing sealant.

### **3.4 FIELD QUALITY CONTROL**

- A. General: Comply with requirements of Section 014000.
- B. Field Hand-Pull Adhesion Test:
1. At field sample or mock-up:
    - a. Before sealant installation is commenced, test materials for indications of staining and poor adhesion to substrate.
    - b. Perform after sealants have fully cured.
    - c. Perform under observation of Architect and manufacturer's technical representative.
  2. Subsequent to commencement of sealant installation:
    - a. Perform under observation of manufacturer's technical representative.
    - b. Perform minimum of 4 times prior to completion of sealant installation.
    - c. Schedule tests at evenly-spaced intervals during sealant installation at discretion of sealant manufacturer.
  3. Procedure:
    - a. Make knife cut through sealant from side to side of joint.
    - b. At joint's sides, make two cuts approximately 2 inches long meeting cut made across joint width.
    - c. Place a mark on cut portion of sealant 1 inch from cut across joint width.
    - d. Use fingers to grasp 2 inch piece of sealant firmly between mark and cut across joint width.
    - e. Pull cut portion outward at an angle of 90 degrees from sealant face.
    - f. Use a ruler to measure distance that sealant is pulled.
    - g. Pull uncut sealant out of joint to distance recommended by manufacturer for testing adhesive capability, but not less than a distance equal to maximum movement capability in extension.
    - h. Hold extended sealant for a minimum of 10 seconds.
    - i. If adhesion is proper, sealant should tear cohesively in itself or be difficult to adhesively remove from joint substrate.
  4. Summarize test results in test report. Indicate:
    - a. Sealants tested.
    - b. Joint substrates.
    - c. Cohesive failures.
    - d. Adhesive failures.
    - e. Pull distance used.
    - f. Actions to correct failures and non-complying conditions.
  5. In absence of noncomplying conditions, sealants which do not indicate adhesive failure from testing will be considered satisfactory.

6. Replace sealant removed from test locations by applying sealant in accordance with manufacturer's requirements for applying sealant to previously sealed joints.

### **3.5 CLEANING**

- A. Clean excess sealants and sealant smears from adjacent surfaces as application progresses; comply with sealant manufacturer's requirements and manufacturer of surface in which joints occur.
- B. Repair or replace defaced or disfigured finishes caused by work of this Section and replace where installation techniques result in unsatisfactory joining of materials and unsightly conditions.

### **3.6 PROTECTION**

- A. Protect in accordance with Section 017300.
- B. Protect sealants from contamination until cured.
- C. Protect sealant joints in horizontal surfaces from foot and vehicular traffic until cured.

### **3.7 SCHEDULE**

- A. Items Not to be Sealed:
  1. Joints, perimeter, and penetrations in fire-rated assemblies. Use firestopping specified in Section 078400.
  2. Joints, perimeter, and penetrations in sound-rated assemblies. Use acoustical sealant specified with sound-rated assembly in Section 092900.
  3. Weep holes in masonry and windows.
- B. Sealant Schedule:
  1. Exterior Locations:
    - a. Wall Joints: Designation S-GP; use primer where required by manufacturer.
    - b. Joints and Perimeter of Penetrations in Horizontal Pedestrian and Vehicle Traffic Surfaces: Designation U-TB.
  2. Interior Joints:
    - a. Wall and Ceiling Joints subject to Movement: Designation S-GP.
    - b. Wall and Ceiling Joints not subject to Movement: Designation AL.
    - c. Concrete Floor Control Joints at Apparatus Bay: Designation CJS.
    - d. Concrete Saw-Cut Joints at Apparatus Bay: Designation RS.
    - e. Interior side of exterior openings: S-GP.
    - f. Floor Joints, including tile: Designation U-TB.
    - g. Interior Sanitary Joints; Joints Between Plumbing Fixtures and Adjoining Floor, Wall, and Ceiling Surfaces; Areas Subject to Frequent Wet Cleaning, including joints between walls and floors, Joints Between Back Splashes and Wall Substrates: Designation S-S.
    - h. Cracks, Gaps, and voids in wall/roof deck intersections subject to air and vapor transmission: Designation U-IA.

**END OF SECTION**

**SECTION 081100**  
**METAL DOORS AND FRAMES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes: Doors, frames, and borrowed lights of hollow metal construction.
- B. Related Sections:
  - 1. Section 081400 – Wood Doors: Wood doors installed in hollow metal frames.
  - 2. Section 087100 - Door Hardware.
  - 3. Section 088000 – Glazing: Including fire rated glazing.
  - 4. Section 099600 – High Performance Coatings: Finish on metal doors and frames.
- C. This Project is a registered US Green Building Council “LEED” project.
  - 1. Select materials to maximize use of recycled steel.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 SYSTEM DESCRIPTION**

- A. General:
  - 1. Meet or exceed ANSI/SDI 250.8 and HMMA 861, and more stringent requirements specified in this Section.
  - 2. Fire Rated Assemblies:
    - a. Fabricate assemblies as tested and approved by Underwriters Laboratories or other nationally recognized testing agency acceptable to authorities having jurisdiction.
    - b. Comply with requirements of NFPA 80.
    - c. Tested in accordance with of NFPA 252 or UL 10B.
    - d. Identify each assembly with factory applied label indicating applicable fire rating.
    - e. Assemblies at stair enclosures require maximum temperature rise not to exceed 450 degrees F above ambient temperature at end of 30 minute fire exposure test.
    - f. Provide “S” label for fire rated doors and frames.
    - g. Provide fire-rated doors with code complying fire rated and impact rated glazing.
  - 3. Hardware Preparation:
    - a. Comply with ANSI A115 Series and SDI 107, except for hardware locations.
    - b. Comply with Section 087100 for hardware locations.
    - c. Mortise, reinforce, drill, and tap frames and doors at factory to receive mortised and concealed hardware in accordance with templates and approved hardware schedules.
    - d. Reinforce frames and doors for surface mounted hardware; drilling and tapping will be in field at time of hardware application.
    - e. Comply with ANSI/SDI A250.8 and SDI 107 for thickness of hardware reinforcing.
- B. Regulatory Requirements: Comply with Authorities Having Jurisdiction and Americans with Disabilities Act (ADA) including ADA Accessibility Guidelines to accommodate barrier free design.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  - 1. Submit for each type of door and frame specified, including details of construction, materials, dimensions, hardware preparation, core, label compliance, profiles, and finishes.
  - 2. Include proof that doors and frames are fabricated in accordance with SDI requirements.
- C. Shop Drawings:
  - 1. Submit schedule indicating opening identification number, door and frame types, sheet metal thickness, dimensions, swing, label, hardware requirements, and undercuts when applicable. Use same identification numbers for openings as shown by Contract Drawings.
  - 2. Include elevations and details indicating door and frame types, profiles, conditions at openings, methods of anchoring, hardware locations, reinforcements for hardware, core construction, and provisions for vision panels and louvers when applicable.

3. Clearly identify work that cannot be permanently factory assembled before shipment. Indicate locations of field splice joints and include associated details to ensure proper assembly at project site.
- D. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
    - a. Doors (steel)
    - b. Frames (steel)
  2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
    - a. Doors (steel)
    - b. Frames (steel)
  3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
    - a. Doors (steel)
    - b. Frames (steel)

#### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Store in protected dry area under cover.
- C. Place units on wood skids and store in manner that will prevent corrosion and damage.
- D. Avoid use of non-vented plastic or canvas coverings which could trap moisture.
- E. Store assemblies upright, do not stack flat. Provide space between stacked assemblies to promote air circulation.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers: Members of Steel Door Institute (SDI) or Hollow Metal Manufacturer's Association (HMMA).
  1. Amweld.
  2. Ceco.
  3. Curries.
  4. Pioneer.
  5. Republic.
  6. Steelcraft.

#### **2.2 MATERIALS**

- A. Maximize use of recycled steel where possible.
- B. Cold-Rolled Steel: ASTM A1008, commercial quality, Class 1, stretcher-leveled, matte finish.
- C. Hot-Rolled Steel: ASTM A1011, commercial quality, pickled, and oiled.
- D. Galvanized / Galvannealed Steel (Exterior and spaces adjacent to the Apparatus Bay):
  1. Sheet: ASTM A653, A40 or G40 coating designation, zinc coated by hot-dip process, commercial quality, stretcher-leveled, mill phosphatized. WCGS not permitted.
  2. Anchors and Accessories: ASTM A879, minimum Class B coating, zinc coated by electro-deposition, commercial quality, mill phosphatized.
- E. Glass: Provide code complying fire rated glazing for 20 minute and 90 minute rated doors.
- F. Anchor Bolts, Fasteners, and Screws: Manufacturer's standard type, except cadmium or zinc plated finish. Stainless steel also acceptable.
- G. Primer: Manufacturer's standard rust inhibitive primer, air-dried or baked, compatible with finish painting specified in Section 099600.

## **2.3 FABRICATION**

### **A. General:**

1. Except where specified or noted otherwise, fabricate frames, door faces and edges using cold-rolled steel. Concealed stiffeners, reinforcing, and other components may be cold-rolled or hot-rolled steel at fabricator's option.
2. Fabricate frames, doors and related components using galvanized/galvannealed steel where assemblies have exposure to exterior atmosphere and for door assemblies adjacent to the Apparatus Bay.
3. Fabricate sheet metal work neat in appearance and free from defects, warps, or buckles.
4. Accurately form metal to required sizes and profiles.
5. Grind and dress exposed welds smooth and flush with adjacent surfaces.
6. Remove tool marks and surface imperfections by dressing, filling, and sanding smooth. Do not use metallic filler to conceal manufacturing defects.

### **B. Edge Clearances:**

1. Between doors and frames at head and jambs: 1/8 inch.
2. Between meeting stiles at pairs of doors: 1/8 inch.
3. Between Bottom Edge of Door and Finish Floor at Non-Label Assemblies: In accordance with HMMA 861, ANSI/SDI A250.8 except where larger undercuts are scheduled. Finish floor is defined as top surface of substrate. Where carpet or other applied surface materials are placed over floor substrate and greater than 1/2 inch thickness, provide 1/4 inch clearance.
4. Between Bottom Edge of Door and Threshold: 1/4 inch.

## **2.4 FABRICATION - FRAMES**

### **A. General Requirements:**

1. Provide frames based on door grade and model in accordance with ANSI/SDI A250.8 and HMMA 820.
2. Welded construction required; knocked-down not acceptable.
3. Fully face weld corners, including stops. Grind weld smooth with adjacent surfaces.
4. Fabricate exterior assemblies and assemblies adjacent to the Apparatus Bay, of 14 gage or 0.067 inch thick galvanized/galvannealed steel.
5. Fabricate interior assemblies of 16 gage or 0.053 inch thick steel.
6. Welded construction required; knocked-down not acceptable. Weld joints smooth, full length of joint.
7. Corners of mitered design; stops coped and butted, or mitered.
8. Accurately cope joints of mullions, rails, and other similar tubular members; reinforce joints with concealed clips or sleeves.
9. Closed or tubular members may be fabricated of two pieces if interlocked at base of stops; visible seams or joints are not acceptable.

### **B. Guard Box:**

1. Closed box design, 26 gage or 0.016 inch minimum, welded to frame.
2. Required at mortise hardware cutouts for assemblies installed within masonry walls or where assemblies will have frames grouted with mortar or similar materials at time of installation.

### **C. Spreader: Manufacturer's standard temporary channel or angles tack welded at bottom of jamb members.**

### **D. Floor Anchor Clips:**

1. Provide at each jamb and mullions which extend to floor.
2. In areas where concrete topping or other similar construction occurs, provide adjustable design to permit securing to depressed subfloor construction. In lieu of adjustable design, frames may extend to subfloor.

### **E. Jamb Anchors: Comply with SDI-111 and HMMA 820.**

1. Masonry Walls: 3/16 inch diameter crimped galvanized wire or corrugated steel T-strap design. Locate near bottom of frame, near top of frame, and 32 inch centers maximum intermittently, minimum 3 per jamb.

2. Metal Stud Wall Systems: Steel clips welded to frame, type or design compatible with stud system. Locate at top of frame, 12 inch from top, and 24 inch centers maximum intermittently, minimum 4 per jamb.
  3. Previously Placed Concrete, Masonry, or Structural Steel: Tension plate and spacer design, welded to frame at approximately 24 inch centers, minimum 3 per jamb. Frames drilled and countersunk for 1/4 inch flathead anchor bolts, set below frame surface.
  4. Label Frames: Comply with fire testing agency label and listing requirements.
- F. Silencers:
1. Drill or Punch Frames for Silencers. Coordinate hole size with silencers specified in Section 087100.
  2. Single Interior Doors: 3 at strike jamb.
  3. Pair of Interior Doors: 2 at header.
  4. Weatherstripped doors: None required.
  5. Sound, Light, or Smoke Sealed Doors: None required.
  6. Transom Panels: 2 at each jamb.
- G. Glazing Beads:
1. Minimum 18 gage or 0.042 inch thick steel, screw-on type, corners butted or mitered, secure with countersunk oval head screws at 12 inch centers maximum, and factory installed prior to shipment.
  2. Place glazing bead on interior or non-secure side of frame.
  3. Coordinate dimensions for glazing rabbets with requirements of Section 088000.

## 2.5 FABRICATION - DOORS

- A. Flush Doors:
1. ANSI/SDI Level 2 and Physical Performance Level B, Heavy Duty, Model 1 (1-3/4 inch thick, 18 gage or 0.042 inch thick face sheets, Full Flush Design).
  2. Option: Custom doors complying with NAAMM Standard HMMA 861 "Type A" may be used in lieu of standard doors constructed in accordance with SDI standards.
  3. Core:
    - a. Interior: Resin impregnated kraft paper honeycomb
    - b. Exterior: Manufacturer's standard insulated core.
    - c. Fire rated Assemblies: Mineral fiber board.
  4. Face sheets broken to form and meet in joint on stile edges.
  5. Vertical edges continuously reinforced from top to bottom with steel channels or flat bars placed immediately inside of face sheets.
  6. Reinforce top and bottom edge full width of door with steel channel not less than 16 gage or 0.053 inch thick.
  7. Fabricate exterior doors with top edge closed flush and fabricate bottom edge with flush closure where required for attachment of weatherstripping. Provide openings in bottom closure of exterior doors to permit escape of entrapped moisture.
  8. Provide insulating material in void spaces for sound deadening in assemblies utilizing internal core of steel stiffeners.
  9. Fill face welds and surface depressions with metallic paste filler or body putty, grind smooth and flush to unblemished finish appearance.
  10. Bevel lock or latch edge 1/8 inch in 2 inches at single doors and at meeting stiles at pairs of doors.
- B. Glazing Beads:
1. Minimum 18 gage or 0.042 inch thick steel, screw on type, corners butted or mitered, welded to door assembly on security side, removable on opposite side.
  2. Factory install and secure loose bead with countersunk oval head screws spaced 8 inch centers maximum and within 2 inches of ends.
  3. Coordinate dimensions for glazing rabbets with requirements of Section 088000.
- C. Vision Openings:
1. Frame openings for sizes indicated.
  2. Provide fire-rated doors with code complying fire rated and impact rated glazing.

3. Equip with glazing beads.
- D. Louvers:
  1. Sightproof stationary blade design, 24 gage or 0.024 inch minimum steel thickness for blades set into and welded to perimeter 20 gage or 0.032 inch thick steel frame.
  2. Blades of inverted V-shape spaced for 50 percent free air.
  3. Minimum 20 gage or 0.032 inch thick steel moldings, corners mitered, welded to door assembly on security side, removable on opposite side.
  4. Factory install and secure loose molding with oval head screws spaced 8 inch centers maximum and within 2 inches of ends.
  5. Louvers pierced into face sheets not acceptable.
  6. Galvanized 14 by 18 wire mesh insect screen in standard folded frame required at louvers in exterior doors.
- E. Transom Panels:
  1. Same basic construction and thickness as specified for flush doors.
  2. Complete with clips, channels, screws, and other devices required for installation.
  3. At locations where panel is located directly above door without horizontal frame member allow 1/8 inch clearance between top of door and bottom edge of panel.
- F. Astragals:
  1. Full height overlapping design, applied on in-active leaf at pairs of interior label doors as necessary to meet label requirements, minimum 20 gage or 0.032 inch thick steel.
  2. Full height overlapping design at pairs of exterior doors, welded on active leaf, 1-3/4 inch by 12 gage or 0.093 inch thick steel.

## **2.6 FINISHES**

- A. Ferrous and Galvanized Steel Assemblies:
  1. Clean surfaces free of mil scale, rust, oil, grease, dirt, and other foreign materials.
  2. Phosphatize or chemically treat surfaces before application of prime coat finish.
  3. Touch-up areas where abrasions and welding have destroyed zinc coating with zinc-rich paint before application of prime coat finish.
  4. Prime Coat: Manufacturer's standard rust inhibitive primer to produce smooth and uniform coat.

## **2.7 ACCESSORIES**

- A. Cement Grout: Portland cement, sand and water; with minimum compressive strength of 3000 psi at seven days.
- B. Bituminous Paint: Zero VOC Coal Tar Epoxy.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.

### **3.2 INSTALLATION**

- A. Install hollow metal assemblies in accordance with SDI 105 and HMMA 840.
- B. Comply with NFPA 80 for fire rated assemblies.
- C. Set frames plumb, level, in true alignment, securely fastened to floor with expansion shields and bolts, and fastened to adjoining walls with specified jamb anchors. Remove temporary spreaders and braces.
- D. Grouted Frames:
  1. CMU Walls:
    - a. Fully grout frames unless noted otherwise.
    - b. Coat inside of frames with bituminous paint.
- E. Fill face of countersunk flathead frame anchors with metallic paste filler; grind smooth and flush with frame surface.

- F. Install doors accurately in frames maintaining specified clearances. Install hardware in accordance with manufacturer's written instructions and associated templates. Refer to Section 087100 for hardware installation requirements.
- G. Install glass in accordance with Section 088000.
- H. Glazed Lights: Set glazing stops in a continuous bead of sealant incorporating glazing gaskets to be continuous around perimeter forming an air tight seal.

### **3.3 ADJUSTMENTS**

- A. After installation of hardware, test and adjust doors for smooth operation.

**END OF SECTION**



**SECTION 081400****WOOD DOORS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes: Solid core wood doors, transparent finish.
- B. Related Sections:
  - 1. Section 081100 - Metal Doors and Frames: Wood door frames.
  - 2. Section 087100 - Door Hardware.
  - 3. Section 088000 - Glazing: Glass for vision panels.
- C. This project is a registered US Green Building Council "LEED" project.
  - 1. Composite wood and agri-fiber products must contain no added urea-formaldehyde resins.
  - 2. Wood framing and blocking shall be certified according to the guidelines of the Forest Stewardship Council.
  - 3. Use of "certified wood" means use of minimum of 50 percent of wood-based materials certified in accordance with the Forest Stewardship Council (FSC) Guidelines for wood building components, including but not limited to framing materials, wood blocking, curbs, cants, nailers, furring, grounds, pedestrian barriers, concrete formwork, and equipment backing boards.
  - 4. Select core board materials to maximize use of rapidly renewable materials.
  - 5. Composite wood and agri-fiber products shall contain no added urea-formaldehyde resins.
  - 6. Provide composite wood and agri-fiber products without added urea-formaldehyde resins complying with LEED Formaldehyde Limits requirements.
  - 7. Adhesives shall comply with VOC and chemical component limits of SCAQMD VOC Limit requirements.
  - 8. Select locally or regionally fabricated products (within 500 miles of jobsite) wherever possible.

**1.2 SYSTEM DESCRIPTION**

- A. Regulatory Requirements:
  - 1. Fire rated assemblies: Conform to NFPA 80 and 252, and UL 10B, and UL 10C (positive pressure).
  - 2. Installation of fire rated assemblies: Conform to NFPA 80 for fire rated class indicated.
  - 3. Provide fire-rated doors with code complying fire rated and impact rated glazing.
  - 4. Comply with Authorities Having Jurisdiction and Americans with Disabilities Act (ADA) including ADA Accessibility Guidelines to accommodate barrier free design.
- B. Fire Ratings Compliance: Fire-rated wood doors to comply with NFPA-80 requirements according to building code standards having local jurisdiction.
  - 1. Neutral Pressure Testing - UBC 43-2 or 7-2-94; or UL10B.
  - 2. Positive Pressure Testing UBC 7-2-97 or UL10C.
  - 3. Positive Pressure:
    - a. UL 10-C – Fire Test: Category A.
    - b. ASTM E2074 – Fire Test
      - 1) After 5 minutes into the test, locate neutral pressure plane at 40 inches above finished floor.
- C. Comply with applicable provisions of Section 9 of *Architectural Woodwork Standards (AWS)*, 2<sup>nd</sup> Edition, October 2014, as adopted and published by Architectural Woodwork Institute and the Woodwork Institute.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  - 1. Submit product data to indicate compliance with specified requirements.

2. Include information for factory finishes.
- C. Shop Drawings:
  1. Submit door schedule indicating opening identification number, door type, grade, size, thickness, swing, label requirements, and undercuts when applicable. Use same identification numbers as Contract Drawings.
  2. Include door elevations indicating type of construction, stile and rail requirements, hardware blocking, stile finishing, provisions for vision panels when applicable, and other pertinent data.
  3. Indicate prefitting and premachining requirements, including hardware locations.
  4. Detail full size sections of vision panel moldings.
- D. Samples:
  1. Submit three 8 by 10 inches sample demonstrating expected color range for each wood veneer, stain, and finish combination.
- E. Submit following Informational Submittals:
  1. Manufacturer's instructions.
- F. Closeout Submittals:
  1. Submit under provisions of Section 017700.
  2. Warranty.
- G. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  1. LEED Credit MR Cost Data: Provide project materials cost data for the following materials. Provide separate data for each different manufacturer used:
    - a. Wood Doors
  2. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
    - a. Wood Doors
  3. LEED Credit MRc7: Provide documentation certifying the percentage of wood based products harvested from a FSC forest.
    - a. Wood
    - b. Provide wood certification submittal documentation including chain-of-custody documentation for all wood based materials installed.
    - c. Provide a spreadsheet of all wood based products used on the project highlighting certified wood based material and include calculations demonstrating that 50% of wood based materials are certified wood.
  4. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
    - a. Adhesives and sealants.
  5. LEED Credit EQc4.4: Composite wood and agri-fiber products shall contain no added urea-formaldehyde resins

#### **1.4 QUALITY ASSURANCE**

- A. Single Source Responsibility: Furnish each type of door from one manufacturer, unless otherwise acceptable to Architect.

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

- A. Comply with requirements of Section 016000.
- B. Protect during transit, storage and handling to prevent damage, soiling and deterioration.
- C. Comply with manufacturer's instructions and AWS requirements for care and handling of doors.
- D. Deliver to site after wet construction operations are completed and dry, and building has reached average prevailing relative humidity.
- E. Deliver components in manufacturer's original unopened protective covering or container, clearly marked with manufacturer's name, brand name, and identifying door opening number on covering.

- F. Storage:
  - 1. Store in clean, dry, well ventilated area protected from sunlight.
  - 2. Avoid extreme heat, cold, dryness or humidity.
  - 3. Store flat over level surface above floor on wood blocking.
  - 4. Under bottom door and over top of stack; furnish plywood or corrugated cardboard for protection.
- G. Handling: Do not drag doors across one another or across other surfaces.

## **1.6 PROJECT CONDITIONS**

- A. Environmental Requirements:
  - 1. Comply with manufacturer's written requirements under which products can be installed
  - 2. Condition doors to average prevailing humidity in installation area prior to hanging.

## **1.7 WARRANTY**

- A. Provide warranties in accordance with Section 017700.
- B. Provide written warranty signed by official of door manufacturer, agreeing to repair or replace defective doors which have:
  - 1. Delamination in any degree.
  - 2. Warp or twist of 1/4 inch or more in any 42 by 84 inch plane of door face.
  - 3. Telegraphing of stile, rail or core through face to cause surface variation in excess of 1/100 inch in any 3 inch span.
- C. Include hanging, installation of hardware and refinishing which may be required due to repair or replacement of defective doors.
- D. Provide warranty for solid core doors for life of original installation.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable 5 Ply (PC-5) Door Manufacturers:
  - 1. Graham Wood Doors, Mason City, IA.
  - 2. Marshfield-Algoma by Masonite Architectural, Marshfield, WI.
  - 3. Eggers Industries, Two Rivers, WI.
  - 4. VT Industries, Holstein, IA.

### **2.2 MATERIALS**

- A. Face Veneer:
  - 1. Grade: As required by AWS quality standard Grade A custom grade.
  - 2. Species: As selected by Architect.
  - 3. Cut: Plain sliced.
  - 4. Matching:
    - a. Book match.
    - b. Sequence match sets for pairs of doors for continuity of veneer and appearance.
- B. Structural Composite Lumber/Structural Laminated Core (SCL): Solid lumber or laminated structural wood core.
  - 1. Free of synthetic formaldehyde resins, independent laboratory certified.
  - 2. Stable, engineered core to eliminate cracking, warping, and splitting.
- C. Particleboard Core:
  - 1. Quality: ANSI A208.1, Grade 1-LD-2.
  - 2. Density for 5-ply doors: 32 lbs/ft<sup>3</sup>.
- D. Adhesives: Type I waterproof and Type II water-resistant, product as recommended by door manufacturer.

- E. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that comply with VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
  - 1. Current requirement refers to the date on which the materials are installed in the building.
  - 2. SCAQMD Rule #1168 referenced in Section 018113 was current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
  - 3. Interior refers to all building construction that is inside of the exterior weatherproofing material.
- F. Glass: Provide code complying fire rated glazing for 20 minute and 90 minute rated doors.

### 2.3 FLUSH DOORS

- A. General:
  - 1. Provide doors in accordance with *Architectural Woodwork Standards*, Section 9.
  - 2. Door thickness: 1-3/4 inch thick.
  - 3. Top and Bottom Rails: Solid or laminated hardwood.
  - 4. Stiles:
    - a. Solid, laminated, or veneered hardwood to match face veneer.
    - b. Screw holding capacity: 600 lbf, ASTM D1037.
    - c. Modified cleavage: 750 lbf, ASTM D143.
  - 5. Crossband: 1/16 inch horizontal hardwood veneer or high-density hardboard.
  - 6. Bonding Adhesive:
    - a. Face Assembly: Type I.
    - b. Core Assembly: Type II.
- B. 5 Ply Door:
  - 1. Quality Standard: AWS PC-5, custom grade.
  - 2. Construction: Face material and crossband bonded to each side of core.
  - 3. Face Material:
    - a. Wood veneer.
    - b. Thickness: 0.020 inch minimum.
  - 4. Core: Particleboard, glued to stiles and rails.
  - 5. Fire Rating: 20 minutes.
- C. Fire Rated 5 Ply Door:
  - 1. Quality Standard: AWS FD-5, custom grade.
  - 2. Construction: Face material and crossband bonded to each side of core.
  - 3. Face Material:
    - a. Wood veneer.
    - b. Thickness: 0.020 inch minimum.
  - 4. Core: Manufacturer's standard non-combustible mineral.
  - 5. Top and Bottom Rails: Structural composite lumber (SCL). Minimum 1-1/8 inch wide at top and bottom rail for typical doors. Minimum 5 inches wide at top rails, complying with WDMA requirements for HB-1 blocking options, for doors equipped with closers or other applied hardware.
  - 6. Fire Rating: As scheduled.
    - a. Neutral pressure - UL 10B/UBC43-2 or 7-2-94.
    - b. Positive pressure - UL 10C/UBC7-2-97.
    - c. Category A Positive Pressure openings have all the intumescent required for compliance contained within the door and require no additional installation of intumescent strips.
    - d. Category B Positive Pressure openings require the addition of intumescent strips to the door and/or frame.

### 2.4 ACCESSORIES

- A. Vision Panel Molding:
  - 1. Non-Rated Doors: Hardwood, species to match face veneer.

2. Fire Rated Doors:
  - a. Hardwood molding with mitered corners, equipped with metal clips or veneer on proprietary noncombustible material, species to match face veneer.
  - b. Molding and accessories to be labeled and listed by UL or other testing agency acceptable to authorities having jurisdiction.
  - c. Provide fire-rated doors with code complying fire rated and impact rated glazing.
3. Fire Rated Doors: Cold rolled steel, 20 gage minimum thickness.

## 2.5 FABRICATION

- A. General:
  1. Factory prefit to size ready for installation; trimming at Project site not permitted. Factory machine for mortised hardware.
  2. Prepare factory prefit and premachined assemblies in accordance with approved frame shop drawings, hardware schedule, and templates.
- B. Fabricating Tolerances:
  1. Prefit size: Plus or minus 1/32 inch overall dimensions.
  2. Squareness: Length of diagonal measured on face of door from upper right corner to lower left corner between length of diagonal measured on upper left corner to lower right corner with maximum difference of 1/8 inch.
  3. Maximum warp: 1/4 inch in any 42 by 84 inch plane of door face.
  4. Show-through (telegraphing): 0.010 inch deviation from true plane in any 3 inch span on door frame.
- C. Fire Rated Assemblies:
  1. Identify each assembly with factory applied label indicating applicable fire rating, fasten to hinge stile edge.
  2. Stairway enclosures constructed for maximum temperature rise not to exceed 450 degrees F above ambient temperature at end of 30 minute fire exposure test with labels indicating this requirement.
  3. Factory machine for mortised hardware. Drill screw holes with 9/64 inch pilot hole to accept No. 12 by 1-1/4 inch threaded-to-head screws.
- D. Edge Clearance:
  1. Between doors and frames at head and jambs: 1/8 inch.
  2. Between meeting stiles at pairs of doors: 1/8 inch.
  3. Between bottom edge and finished floor: 1/2 inch, except where larger undercuts are scheduled at non-fire rated assemblies.
- E. Stile Edge Treatment:
  1. Bevel strike stile of single doors and meeting stiles at pairs of doors 1/8 inch in 2 inches.
  2. Bevel hinge stile of fire doors 1/16 inch in 2 inches.
- F. Machining for Hardware:
  1. Factory machine for hardware requiring mortising and routing.
  2. Machining not required for surface mounted hardware.
  3. Prepare in accordance with applicable ANSI A115-W Series, except for hardware locations.
  4. Prepare in accordance with templates and approved hardware schedule.
  5. Pilot drill screw and bolt holes.
  6. Locate hardware in accordance with requirements specified in Section 087100.
- G. Vision Panels:
  1. Factory cut openings.
  2. For non-labeled doors, trim openings with hardwood moldings fixed one side, removable other side, and corners mitered.
  3. For 20-minute fire rated doors, use fire rated system of concealed metal clips and hardwood molding.
  4. For fire rated doors above 20 minute rating, frame openings with through-bolted metal framing.
  5. Locate panels where indicated; 6 inches minimum required between edge of cutout and door edge.

6. Coordinate dimensions for glazing rabbets with requirements of Section 088000.

## **2.6 FINISHING**

- A. Comply with *Architectural Woodwork Standards*, Section 5 for types of factory applied finish systems indicated.
- B. Contractor's Option: AWS System 11 Catalyzed Polyurethane or AWS System 5 Conversion Varnish , transparent finish:
  1. Quality Grade: Custom.
  2. Stain: To match sample.
  3. Degree of Sheen: Medium rubbed.
- C. Seal top and bottom edges, vision panel cutouts, and mortised hardware cutouts using manufacturer's standard sealer.
- D. Metal edges, metal vision panel frames, and astragals:
  1. Manufacturer's standard oven cured low luster enamel.
  2. Custom colors selected by Architect.
- E. Finish hardwood moldings to match face veneers.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
  1. Verify frames are properly sized and set square and true.

### **3.2 INSTALLATION**

- A. Install in accordance with Section 017300, approved shop drawings, and manufacturer's written instructions.
- B. Install accurately in frame, within clearances specified. Install hardware in accordance with manufacturer's written instructions and associated templates. Refer to Section 087100 for general installation requirements.
- C. Install doors to operate freely, but not loosely, free from hinge bound conditions, sticking, or binding. Do not install in frames which would hinder operation of doors.
- D. Ensure doors are free from rattling when in latched position.
- E. Install glass in accordance with Section 088000.
- F. Glazed Lights: Set glazing stops in a continuous bead of sealant incorporating glazing gaskets to be continuous around perimeter forming an air tight seal.

### **3.3 ADJUSTING**

- A. After installation of hardware, adjust and check each door to ensure proper operation and function.
- B. Replace or rehang doors which are hinge bound and do not swing or operate freely.
- C. Remove and replace doors which are warped, twisted or which are not in true planes.
- D. Replace factory finished doors damaged during installation.

### **3.4 CLEANING AND PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish.

**END OF SECTION**

**SECTION 083100**  
**ACCESS DOORS AND PANELS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Requirement of Products Covered Under This Section:
  - 1. Furnish and install access panels as required to access plumbing, fire protection, mechanical and electrical work as necessary for operation and maintenance of concealed equipment, valves, cleanouts, controls, and other similar devices requiring access.
  - 2. Coordinate requirements with Divisions 21, 22, 23, and 26.
- B. Related Sections:
  - 1. Section 087100 - Door Hardware: Keyed cylinders.
  - 2. Section 099000 - Paints and Coatings: Field paint finish.
  - 3. Division 22 – Plumbing: Coordinate access panel location.
  - 4. Division 23 – Heating, Ventilating, and Air Conditioning: Coordinate access panel location.
  - 5. Division 26 – Electrical: Coordinate access panel location.
- C. This Project is a registered US Green Building Council “LEED” project.
  - 1. Select materials to maximize use of recycled steel.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 SYSTEM DESCRIPTION**

- A. Design Requirements:
  - 1. Determine specific locations and sizes for access doors and panels needed to gain access to concealed equipment, and indicate on schedule specified under “Submittals” Article.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit product data for each type of access panel.
- C. Shop Drawings: Include complete schedule indicating types, locations, sizes, wall and ceiling construction details, latching and locking provisions, and other pertinent data.
- D. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
    - a. Access Doors
  - 2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
    - a. Access Doors
  - 3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
    - a. Access Doors

**1.4 QUALITY ASSURANCE**

- A. Single Source Responsibility: Obtain materials for systems from either a single manufacturer or from manufacturer approved by systems manufacturer to ensure quality of appearance and performance.
- B. Fire-Resistance Ratings: Appropriate UL or Warnock Hersey label required on fire rated assemblies.
- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units which may vary from sizes indicated on Drawings.

- D. Coordination: Furnish inserts and anchoring devices which required to be built into other work for installation of access panels. Coordinate delivery with other work to avoid delay.

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

- A. Comply with requirements of Section 016000.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers:
  - 1. J. L. Industries, Bloomington, MN.
  - 2. Karp Associates, Inc., Maspeth, NY.
  - 3. Milcor Incorporated, Lima, OH.
  - 4. Nystrom Products Company, Minneapolis, MN.
  - 5. The Williams Brothers Corporation of America, Front Royal, VA

### **2.2 MATERIALS AND FABRICATION**

- A. Steel Assemblies: Fabricate of sheet steel complying with ASTM A1008.
- B. Frames:
  - 1. Fabricate with casing bead welded to perimeter of frame for assemblies installed in gypsum board surfaces.
  - 2. Fabricate of not less than 16 gage materials.
  - 3. Fabricate with exposed flange of nominal 1 inch wide around perimeter for assemblies installed in following construction:
    - a. Exposed masonry or concrete.
    - b. Ceramic tile.
- C. Non-Rated Flush Panels: Fabricate of not less than 14 gage sheet materials. Equip with concealed spring hinges or concealed continuous piano hinge designed to open 175 degree minimum.
- D. Recessed Panels:
  - 1. Frames:
    - a. Fabricate of not less than 14 gage materials.
    - b. Fabricate with casing bead welded to perimeter of frame for assemblies installed in gypsum board surfaces.
  - 2. Non-Rated Recessed Panels:
    - a. Fabricate recessed pan of 16 gage.
    - b. Factory install gypsum board flush to door surface.
    - c. Equip with concealed hinges.
  - 3. Basis of Design: Model RDWPD, Karp Associates, Inc.
- E. Locking Devices: Provide flush, screwdriver-operated cam locks of number required by manufacturer to hold panel in flush, smooth plane when closed.

### **2.3 FINISH**

- A. Steel Assemblies:
  - 1. Clean surfaces free of mil scale, rust, oil, grease, dirt, and other foreign materials.
  - 2. Phosphatize or chemically treat surfaces before application of prime coat finish.
  - 3. Apply rust inhibitive primer to produce uniform smooth coat at 2.0 mils minimum dry film thickness.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify rough openings are correctly located, sized and prepared for installation.



**3.2 INSTALLATION**

- A. Install plumb, level, square and rigidly secured in accordance with Section 017300.
- B. Position for convenient access to concealed work requiring access.

**3.3 ADJUSTMENTS**

- A. After installation, test and adjust panels and hardware for smooth operation.

**END OF SECTION**



**SECTION 083613**  
**SECTIONAL DOORS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Aluminum framed overhead doors with glazing.
- B. Related Sections:
  - 1. Section 055000 - Metal Fabrications: Steel framing for openings.
  - 2. Division 26 - Electrical: Electrical service.

**1.2 SYSTEM REQUIREMENTS**

- A. Design Requirements: Manufacturer is responsible for designing units, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
- B. Interface with Adjacent Systems:
  - 1. Integrate design and connections with adjacent construction.
  - 2. Accommodate allowable tolerances and deflections for structural members in installation.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit product data, wiring diagrams, and rough-in requirements.
- C. Shop Drawings: Submit drawings for components and installations which are not fully dimensioned or detailed on manufacturer's literature.
- D. Submit following Informational Submittals:
  - 1. Support reactions design data.
  - 2. Certifications specified in Quality Assurance article.
  - 3. Manufacturer's instructions.
- E. Closeout Submittals:
  - 1. Submit under provisions of Section 017700.
  - 2. Operation and maintenance data.

**1.4 QUALITY ASSURANCE**

- A. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Acceptable Manufacturers:
  - 1. Arm-R-Lite, South Plainfield, NJ.
  - 2. Windsor Republic Door, Little Rock, AR.
  - 3. Overhead Door Company, Dallas, TX.
  - 4. Raynor Manufacturing Company, Dixon, IL.
  - 5. Wayne Dalton.

**2.2 COMPONENTS AND FABRICATION**

- A. Sectional Aluminum Framed Door Assembly: Stile and rail assembly secured with 1/4 inch diameter through rods with glazed panel infill configuration as indicated on Exterior Elevations.
  - 1. Stiles and Rails: 6063 - T6 aluminum.
  - 2. Panel Thickness: 1-3/4 inches.
  - 3. Glazing: Translucent glazing panels, safety glass, insulated.
- B. Track Type: Vertical Lift

- C. Weight Counterbalance for lift clearance and vertical lift type configurations
- D. Operation: Provide electric door operator assembly of size and capacity recommended and provided by door manufacturer for door and 100,000 operation-cycle requirements, with electric motor and factory-prewired motor controls, starter, gear-reduction unit, solenoid-operated brake, clutch, remote-control stations, control devices, integral gearing for locking door, electric eyes, warning lights, warning horn, radio transmitter, and accessories required for proper operation.
  - 1. To raise the door a signal is sent from either the truck remote, wall switch, ramp switch or watch room switch.
    - a. The yellow warning lights (interior and exterior) will flash and the door will rise.
    - b. The green warning lights (interior and exterior) will light when the door is in the fully open position
  - 2. To lower the door a signal is sent from either the truck remote, wall switch, ramp switch or watch room switch
    - a. The yellow warning lights (interior and exterior) will flash and the audible warning will sound for 5 seconds.
    - b. The yellow interior warning light will switch to red at the beginning of the closing cycle. The exterior warning light will continue to flash yellow.
  - 3. When the door is closed all signals stop.

### **2.3 FINISH**

- A. Clear Anodized:
  - 1. Conforming to AA-M12C22A41.
  - 2. Architectural Class I, etched, medium matte, clear anodic coating, 0.7 mil minimum thickness.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify that openings are prepared with headers level, jambs plumb, floor level, without projections, and correctly dimensioned to receive coiling grille.

### **3.2 INSTALLATION**

- A. Install assemblies and operating equipment complete with operators, controls, and related accessories in accordance with Section 017300 and approved shop drawings.
- B. Coordinate installation with electrical service.
- C. Upon completion of installation, including work by other trades, test and adjust grilles to operate easily, free from warp, twist or distortion.
- D. Clean surfaces, joints and bearings of unit in accordance with manufacturer's instructions; lubricate as recommended by manufacturer.

**END OF SECTION**

**SECTION 084113****ALUMINUM FRAMED ENTRANCES AND STOREFRONTS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Entrance and storefront systems, complete with reinforcing, sill extrusions, fasteners, anchors, and attachment devices.
  - 2. Aluminum doors complete with hardware.
  - 3. Accessories necessary to complete work.
- B. Related Sections:
  - 1. Section 014450 – Building Envelope Design Requirements.
  - 2. Section 079200 - Joint Sealants: Perimeter sealants and backup materials.
  - 3. Section 087100 - Door Hardware: Keyed cylinders.
  - 4. Section 088000 - Glass and Glazing.
- C. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select materials to maximize use of recycled aluminum.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 SYSTEM REQUIREMENTS**

- A. General: In addition to requirements shown or specified, comply with design requirements of Section 014450.
- B. Design Requirements:
  - 1. Manufacturer is responsible for designing system, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
  - 2. Employ registered professional engineer, licensed to practice structural engineering in jurisdiction where Project is located, to engineer each component of storefront system.
  - 3. Drawings are diagrammatic and do not purport to identify nor solve problems of thermal or structural movement, glazing, anchorage, or moisture disposal.
  - 4. Requirements shown by details are intended to establish basic dimension of units, sight lines and profiles of members.
  - 5. Provide concealed fastening wherever possible.
  - 6. Provide entrance and storefront systems, including necessary modifications, to meet specified requirements and maintaining visual design concepts.
  - 7. Attachment considerations are to take into account site peculiarities and expansion and contraction movements so there is no possibility of loosening, weakening or fracturing connection between units and building structure or between units themselves.
  - 8. Anchors, fasteners and braces shall be structurally stressed not more than 50 percent of allowable stress when maximum loads are applied.
  - 9. Provide for expansion and contraction due to structural movement without detriment to appearance or performance.
  - 10. Assemblies shall be free from rattles, wind whistles and noise due to thermal and structural movement and wind pressure.
- C. Thermal Requirements:
  - 1. Framing systems shall accommodate expansion and contraction movement due to surface temperature differentials of 180 degrees F without causing buckling, stress on glass, failure of joint seals, excessive stress on structural elements, reduction of performance, or other detrimental effects.
  - 2. Ensure doors function normally within limits of specified temperature range.
  - 3. Deflection: Maximum calculated deflection of any framing member in direction normal to plane of wall when subjected to specified design pressures shall not exceed 1/175 of its clear span or 3/4 inch, whichever is less

4. Testing Requirements: Provide components that have been previously tested by an independent testing laboratory.
- D. Interface With Adjacent Systems:
  1. Integrate design and connections with adjacent construction.
  2. Accommodate allowable tolerances and deflections for structural members in installation.

### 1.3 SUBMITTALS

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  1. Submit product data for storefront system.
  2. Include information for factory finishes, hardware, accessories and other required components.
- C. Shop Drawings:
  1. Submit shop drawings created by storefront manufacturer covering fabrication, installation, and finish of specified systems.
  2. Stamp shop drawings with seal and signature of professional engineer responsible for design.
  3. Include following:
    - a. Fully dimensioned plans and elevations with detail coordination keys.
    - b. Locations of exposed fasteners and joints.
  4. Provide Detailed Drawings of:
    - a. Composite members.
    - b. Joint connections for framing systems and for entrance doors.
    - c. Anchorage.
    - d. System reinforcements.
    - e. Drainage patterns and sill extrusions.
    - f. Expansion and contraction provisions.
    - g. Hardware, including locations, mounting heights, reinforcements and special installation provisions.
    - h. Glazing methods and accessories.
    - i. Internal sealant requirements and recommended types.
    - j. Thermal breaks.
    - k. Transitions to adjacent opaque wall air barrier and flashing components.
  5. Schedule of finishes.
- D. Samples:
  1. Submit samples indicating quality of finish on alloys used for work, 12 inches long for extrusions and 6 inches square for sheet materials.
  2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.
- E. Submit following Informational Submittals:
  1. Test Reports:
    - a. Standard Systems: Submit certified copies of previous test reports substantiating performance of system in lieu of retesting. Include other supportive data as necessary.
  2. Support reactions design data.
  3. Certifications specified in Quality Assurance article.
  4. Qualification Data: Manufacturer's, engineer's, and installer's qualification data.
  5. Manufacturer's installation instructions.
- F. Closeout Submittals:
  1. Submit under provisions of Section 017700.
  2. Warranty: Submit specified warranty.
- G. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Framing Materials and Accessories.

2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
  - a. Framing Materials and Accessories.
3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
  - a. Framing Materials and Accessories.

#### **1.4 QUALITY ASSURANCE**

- A. Single Source Responsibility:
  1. To ensure quality of appearance and performance, obtain materials for systems from either a single manufacturer or from manufacturer approved by systems manufacturer.
- B. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering in jurisdiction where Project is located, with minimum of 5 years experience in design of storefront systems.
- C. Installer Qualifications: Certified in writing by system manufacturer as qualified for installation of specified systems.
- D. Regulatory Requirements: Comply with Authorities Having Jurisdiction and Americans with Disabilities Act (ADA) including ADA Accessibility Guidelines to accommodate barrier free design.
- E. Certifications:
  1. Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.
  2. Submit manufacturer's certificate stating that sealed insulating glass meet or exceed specified requirements.
  3. Engineering certifications.

#### **1.5 MOCK-UPS**

- A. General: Comply with provisions of Drawing Sheet A-053.
- B. Visual Mock-Up:
  1. Construct mock-up as indicated.
  2. Coordinate with associated materials and assemblies.
  3. Include sealants, glazing, and connections to air barrier assemblies.
  4. Locate on site where directed by Architect.

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

- A. Comply with requirements of Section 016000.
- B. Protect finished surfaces as necessary to prevent damage.
- C. Do not use adhesive papers or sprayed coatings which become firmly bonded when exposed to sun.
- D. Do not leave coating residue on any surfaces.
- E. Replace damaged units.

#### **1.7 WARRANTY**

- A. Provide warranties in accordance with Section 017700.
- B. Provide written warranty jointly signed by manufacturer, installer and Contractor agreeing to repair and/or replace assemblies which fail in material or workmanship during warranty period of 2 years from date of Substantial Completion.
- C. Provide written warranty stating organic coating finish will be free from fading more than 10 percent, chalking, yellowing, peeling, cracking, pitting, corroding or non-uniformity of color, or gloss deterioration beyond manufacturer's descriptive standards for 10 years from date of Substantial Completion.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Entrance and Storefront Manufacturers:
  - 1. Arcadia, Inc., Vernon, CA.
  - 2. EFCO Corporation, Monett, MO.
  - 3. Kawneer Company, Inc., Norcross, GA.
  - 4. Vistawall Architectural Products, Terrell, TX.
- B. Acceptable Entrance and Storefront Products:
  - 1. Storefront and Entrance Framing Systems:
    - a. Model Tri-Fab VG (VersaGlaze®) 451T, Kawneer Company, Inc., Norcross, GA.
    - b. Equivalent system by listed acceptable manufacturers is acceptable.
  - 2. Entrance Doors: 350 Medium Stile as manufactured by Kawneer Company, Inc., Norcross, GA.

**2.2 FRAMING MATERIALS AND ACCESSORIES**

- A. Aluminum:
  - 1. ASTM B221, alloy 6063-T5 for extrusions; ASTM B209, alloy 5005-H16 for sheets; or other alloys and temper recommended by manufacturer appropriate for specified finish.
  - 2. Minimum thickness of 0.125 inch for framing members and rails, 0.090 inch for sheets, and 0.050 inch for glazing stops and similar components.
  - 3. Provide aluminum with 20% minimum post-consumer recycled content.
- B. Internal Reinforcing:
  - 1. ASTM A36 for carbon steel; or ASTM B308 for structural aluminum.
  - 2. Shapes and sizes to suit installation.
  - 3. Steel components factory coated with alkyd type zinc chromate primer complying with FS TT-P-645, applied after fabrication.
- C. Anchorage Devices:
  - 1. Manufacturer's standard formed or fabricated steel or aluminum assemblies of shapes, plates, bars or tubes.
  - 2. Hot-dip galvanize steel assemblies after fabrication, comply with ASTM A123, 2.0 ounce minimum coating.
  - 3. Self-Drilling, Self-tapping Fasteners: Elco Dril-Flex with Stalgard Finish; no substitutions.
- D. Fasteners:
  - 1. Aluminum, non-magnetic stainless steel or other non-corrosive materials compatible with items being fastened.
  - 2. Provide concealed fasteners wherever possible.
  - 3. For exposed locations, provide Phillips flathead screws with finish matching item fastened.
  - 4. For concealed locations, provide manufacturer's standard fasteners.
- E. Self-Drilling, Self-tapping Fasteners: Elco Dril-Flex with Stalgard Finish; no substitutions.
- F. Protective Coatings: Cold-applied asphalt mastic complying with SSPC-Paint 12, compounded for 30 mil thickness for each coat; or alkyd type zinc chromate primer complying with FS TT-P-645.
- G. Touch-Up Primer for Galvanized Components: Zinc oxide conforming with FS TT-P-641.
- H. Glazing Gaskets:
  - 1. Compression type design, replaceable, molded or extruded, of neoprene, polyvinyl chloride (PVC), or ethylene propylene diene monomer (EPDM).
  - 2. Conform to ASTM C509 or C864.
  - 3. Profile and hardness as required to maintain uniform pressure for watertight seal.
- I. Weatherstripping:
  - 1. Wool pile conforming to AAMA 701.2; or extruded elastomeric conforming to ASTM C509 or C864.
  - 2. Provide EPDM or vinyl-blade gasket weatherstripping in bottom door rail, adjustable for contact with threshold.
- J. Internal Sealants and Baffles: Types recommended by systems manufacturer.



**2.3 DOOR HARDWARE**

- A. Hardware Items: Refer to Section 087100.

**2.4 FABRICATION**

- A. Coordination of Fabrication:
1. Check actual frame or door openings required in construction work by accurate field measurements before fabrication.
  2. Fabricate units to withstand loads which will be applied when system is in place.
- B. General:
1. Provide each unit of framework continuous.
  2. Disassemble only to extent necessary for shipment and installation.
  3. Conceal fasteners wherever possible.
  4. Reinforce work as necessary for performance requirements, to eliminate sag, and for support to structure.
  5. Separate dissimilar metals and aluminum in contact with concrete utilizing protective coating or preformed separators which will prevent contact and corrosion.
  6. Comply with Section 088000 for glazing requirements.
- C. Aluminum Framing:
1. Provide members of size, shape and profile indicated, designed to provide for glazing from exterior.
  2. Provide manufacturer's standard thermal isolation between exterior and interior aluminum extrusions.
  3. Fabricate frame assemblies with mitered or coped joints.
  4. Reinforce to develop full strength and maximum rigidity in framework.
  5. Reinforce internally with structural members as necessary to support design loads.
  6. Maintain accurate relation of planes and angles, with hairline fit of contacting members.
  7. Seal horizontals and direct moisture accumulation to exterior.
  8. Provide flashings and other materials used internally or externally that are corrosive resistant, non-staining, non-bleeding and compatible with adjoining materials.
  9. Fabricate framing for expansion and contraction due to temperature changes without detrimental to appearance or performance.
  10. Make provisions in framing for minimum edge clearance, nominal edge cover and nominal pocket width for thickness and type of glazing or infill used in accordance with recommendations of manufacturer and GANA Glazing Manual.
- D. Entrance Doors:
1. Standard medium stile with manufacturer's standard features.
  2. Fabricate with mechanical clips and welded joints. Tie-rods not acceptable.
  3. Provide extruded aluminum glazing stops of square design, permanently anchored on security side and removable on opposite side.
- E. Hardware:
1. Receive hardware supplied in accordance with Section 087100 and install in accordance with requirements of this Section.
  2. Cut, reinforce, drill and tap frames and doors as required to receive hardware.
  3. Comply with hardware manufacturer's templates and instructions.
  4. Use concealed fasteners wherever possible.
- F. Welding:
1. Comply with recommendations of the American Welding Society.
  2. Use recommended electrodes and methods to avoid distortion and discoloration.
  3. Grind exposed welds smooth and flush with adjacent surfaces; restore mechanical finish.

**2.5 FINISH**

- A. Fluoropolymer Coating:
1. Comply with AAMA 2605.
  2. Resin: 70 percent polyvinylidene fluoride (PVDF).
  3. Substrate: Cleaned and pre-treated.

4. Primer:
  - a. Coating: Manufacturer's standard resin based compatible coating.
  - b. Dry Film Thickness: Minimum 0.20 mil.
5. Topcoat:
  - a. Coating: PVDF.
  - b. Dry Film Thickness:
    - 1) Coil: 0.80 mil.
    - 2) Extrusion: 1.0 mil
6. Color: Custom per Architect.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.

#### **3.2 INSTALLATION**

- A. Erection Tolerances:
  1. Limit Variations from Plumb and Level:
    2. 1/8 inch in 10'-0" vertically.
    3. 1/8 inch in 20'-0" horizontally.
  4. Limit Variations from Theoretical Locations: 1/4 inch for any member at any location.
  5. Limit Offsets in Theoretical End-To-End and Edge-To-Edge Alignment: 1/16 inch from flush surfaces not more than 2 inches apart or out-of-flush by more than 1/4 inch.
- B. Install doors and hardware in accordance with manufacturer's printed instructions.
- C. Set units plumb, level and true to line, without warp or rack of frame.
- D. Anchor securely in place, allowing for required movement, including expansion and contraction.
- E. Separate dissimilar materials at contact points, including metal in contact with masonry or concrete surfaces, with bituminous paint or preformed separators to prevent contact and corrosion.
- F. Set sill members in bed of sealant. Set other members with internal sealants and baffles to provide weathertight construction.

#### **3.3 FIELD QUALITY CONTROL**

- A. Site Tests: Comply with requirements of Section 014000.
- B. Perform Hose Test in accordance with Section 014450.

#### **3.4 ADJUSTING**

- A. Test Door Operating Functions. Adjust closing and latching speeds and other hardware in accordance with manufacturer's instructions to ensure smooth operation.

#### **3.5 CLEANING**

- A. Clean surfaces in compliance with manufacturer's recommendations; remove excess mastic, mastic smears, foreign materials and other unsightly marks.
- B. Clean metal surfaces exercising care to avoid damage.

**END OF SECTION**

**SECTION 08 71 00****DOOR HARDWARE****PART 1 - GENERAL****1.1 SUMMARY:**

- A. Section Includes: Finish Hardware for door openings, except as otherwise specified herein.
  - 1. Door hardware for steel (hollow metal) doors.
  - 2. Door hardware for aluminum doors.
  - 3. Door hardware for wood doors.
  - 4. Door hardware for other doors indicated.
  - 5. Keyed cylinders as indicated.
- B. Related Sections:
  - 1. Division 6: Rough Carpentry.
  - 2. Division 8: Aluminum Doors and Frames
  - 3. Division 8: Hollow Metal Doors and Frames.
  - 4. Division 8: Wood Doors.
  - 5. Division 26 Electrical
  - 6. Division 28: Electronic Security
- C. References: Comply with applicable requirements of the following standards. Where these standards conflict with other specific requirements, the most restrictive shall govern.
  - 1. Builders Hardware Manufacturing Association (BHMA)
  - 2. NFPA 101 - Life Safety Code
  - 3. NFPA 80 - Fire Doors and Windows
  - 4. ANSI A156.1 - Butts and Hinges
  - 5. ANSI A156.2 - Bored and Preassembled Locks and Latches
  - 6. ANSI A156.3 - Exit Devices
  - 7. ANSI A156.4 - Door Controls - Closers
  - 8. ANSI A156.5 - Cylinders and Input Devices for Locks
  - 9. ANSI A156.6 - Architectural Door Trim
  - 10. ANSI A156.7 - Template Hinge Dimensions
  - 11. ANSI A156.8 - Door Controls – Overhead Stops and Holders
  - 12. ANSI A156.16 - Auxiliary Hardware
  - 13. ANSI A156.18 - Materials and Finishes
  - 14. ANSI A156.21 - Thresholds
  - 15. ANSI A156.22 - Door Gasketing and Edge Seal Systems
  - 16. ANSI A156.25 - Electrified Locking Devices
  - 17. ANSI A156.26 - Continuous Hinges
  - 18. ANSI A156.28 - Recommended Practices for Mechanical Keying Systems
  - 19. ANSI A156.30 - High Security Cylinders
  - 20. UL10C – Positive Pressure Fire Test of Door Assemblies
  - 21. ANSI-A117.1 – Accessible and Usable Buildings and Facilities 2009
  - 22. DHI /ANSI A115.IG – Installation Guide for Doors and Hardware
- D. Intent of Hardware Groups

1. Should items of hardware not definitely specified be required for completion of the Work, furnish such items of type and quality comparable to adjacent hardware and appropriate for service required.
  2. Where items of hardware aren't definitely or correctly specified, are required for completion of the Work, a written statement of such omission, error, or other discrepancy to be submitted to Architect, prior to date specified for receipt of bids for clarification by addendum; or, furnish such items in the type and quality established by this specification, and appropriate to the service intended.
- E. Allowances
1. Refer to Division 1 for allowance amount and procedures.
- F. Alternates
1. Refer to Division 1 for Alternates and procedures.
- 1.2 SUBSTITUTIONS:
- A. Comply with Division 1.
- 1.3 SUBMITTALS:
- A. Comply with Division 1.
- B. Special Submittal Requirements: Combine submittals of this Section with Sections listed below to ensure the "design intent" of the system/assembly is understood and can be reviewed together.
- C. Product Data: Manufacturer's specifications and technical data including the following:
1. Detailed specification of construction and fabrication.
  2. Manufacturer's installation instructions.
  3. Wiring diagrams for each electric product specified. Coordinate voltage with electrical before submitting.
  4. Submit 6 copies of catalog cuts with hardware schedule.
  5. Provide 9001-Quality Management and 14001-Environmental Management for products listed in Materials Section 2.2
- D. Shop Drawings - Hardware Schedule: Submit 6 complete reproducible copy of detailed hardware schedule in a vertical format.
1. List groups and suffixes in proper sequence.
  2. Completely describe door and list architectural door number.
  3. Manufacturer, product name, and catalog number.
  4. Function, type, and style.
  5. Size and finish of each item.
  6. Mounting heights.
  7. Explanation of abbreviations and symbols used within schedule.
  8. Detailed wiring diagrams, specially developed for each opening, indicating all electric hardware, security equipment and access control equipment, and door and frame rough-ins required for specific opening.
- E. Templates: Submit templates and "reviewed Hardware Schedule" to door and frame supplier and others as applicable to enable proper and accurate sizing and locations of cutouts and reinforcing.

1. Templates, wiring diagrams and "reviewed Hardware Schedule" of electrical terms to electrical for coordination and verification of voltages and locations.

F. Samples: (If requested by the Architect)

1. 1 sample of Lever and Rose/Escutcheon design, (pair).
2. 3 samples of metal finishes

G. Contract Closeout Submittals: Comply with Division 1 including specific requirements indicated.

1. Operating and maintenance manuals: Submit 3 sets containing the following.
  - a. Complete information in care, maintenance, and adjustment, and data on repair and replacement parts, and information on preservation of finishes.
  - b. Catalog pages for each product.
  - c. Name, address, and phone number of local representative for each manufacturer.
  - d. Parts list for each product.
  - e. Inventory of attic stock items.
2. Copy of final hardware schedule, edited to reflect, "As installed".
3. Copy of final keying schedule
4. As installed "Wiring Diagrams" for each piece of hardware connected to power, both low voltage and 110 volts.
5. One set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

1.4 QUALITY ASSURANCE

A. Comply with Division 1.

1. Statement of qualification for distributor and installers.
2. Statement of compliance with regulatory requirements and single source responsibility.
3. Distributor's Qualifications: Firm with 3 years experience in the distribution of commercial hardware.
  - a. Distributor to employ full time Architectural Hardware Consultants (AHC) for the purpose of scheduling and coordinating hardware and establishing keying schedule.
  - b. Hardware Schedule shall be prepared and signed by an AHC.
4. Installer's Qualifications: Door hardware shall be installed by 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. Installer shall participate in manufacturer's training of hardware items as required for proper for installation.
5. Regulatory Label Requirements: Provide testing agency label or stamp on hardware for labeled openings.
  - a. Provide UL listed hardware for labeled and 20 minute openings in conformance with requirements for class of opening scheduled.
  - b. Underwriters Laboratories requirements have precedence over this specification where conflict exists.

6. Single Source Responsibility: Except where specified in hardware schedule, furnish products of only one manufacturer for each type of hardware.

- B. Review Project for extent of finish hardware required to complete the Work. Where there is a conflict between these Specifications and the existing hardware, notify the Architect in writing and furnish hardware in compliance with the Specification unless otherwise directed in writing by the Architect.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Packing and Shipping: Comply with Division 1.
  1. Deliver products in original unopened packaging with legible manufacturer's identification.
  2. Package hardware to prevent damage during transit and storage.
  3. Mark hardware to correspond with "reviewed hardware schedule".
  4. Deliver hardware to door and frame manufacturer upon request.
- B. Storage and Protection: Comply with manufacturer's recommendations.

#### 1.6 PROJECT CONDITIONS:

- A. Coordinate hardware with other work. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated, as necessary for the proper installation and function, regardless of omissions or conflicts in the information on the Contract Documents.
- B. Review Shop Drawings for doors and entrances to confirm that adequate provisions will be made for the proper installation of hardware.

#### 1.7 WARRANTY:

- A. Refer to Conditions of the Contract
- B. All manufacturers screws and attachments supplied with each hardware item must be installed to maintain the warranty.
- C. Warranty shall commence with substantial completion of the project.
- D. Provide assurance that forms have been completed in the Owner's name and registered with the manufacturer.
- E. Manufacturer's Warranty: Submit written warranty from hardware manufacturer and provide written guarantee as follows:
  1. Hinges: Life of Building
  2. Locksets: Ten (10) years
  3. Exit Devices: Five (5) years
  4. Closers: Ten (10) years
  5. Electrified door operators and electric hinges: Two (2) years
  6. Balance of electrified hardware: One (1) year
  7. All other hardware: Two (2) years.

#### 1.8 OWNER'S INSTRUCTION:

- A. Instruct Owner's personnel in operation and maintenance of hardware units.

## 1.9 MAINTENANCE:

- A. Extra Service Materials: Deliver to Owner extra materials from same production run as products installed. Package products with protective covering and identify with descriptive labels. Comply with Division 1 Closeout Submittals Section.
1. Special Tools: Provide special wrenches and tools applicable to each different or special hardware component.
  2. Maintenance Tools: Provide maintenance tools and accessories supplied by hardware component manufacturer.
  3. Delivery, Storage and Protection: Comply with Owner's requirements for delivery, storage and protection of extra service materials.
- B. Maintenance Service: Submit for Owner's consideration maintenance service agreement for electronic products installed.

## PART 2 - PRODUCTS

## 2.1 MANUFACTURERS:

- A. The following manufacturers are approved subject to compliance with requirements of the Contract Documents. Approval of manufacturers other than those listed shall be in accordance with Division 1.

<u>Item:</u>	<u>Manufacturer:</u>	<u>Approved:</u>
Hinges	Stanley	Hager, Ives, McKinney
Continuous Hinges	ABH	Ives, McKinney, Roton, Select
Locksets	Best	Corbin Russwin, Schlage
Cylinders	Best CORMAX	NO Substitution
Exit Devices	Precision	Von Duprin, Corbin Russwin
Power Transfers	Precision	ABH, Corbin Russwin, Von Duprin
Closers	Stanley 100 Series	LCN 4040XP, Norton 7500
Push/Pull Plates	Trimco	Hager, Ives, Rockwood
Push/Pull Bars	Trimco	Hager, Ives, Rockwood
Protection Plates	Trimco	Hager, Ives, Rockwood
Overhead Stops	ABH	Dorma, GJ, Rockwood, Sargent
Door Stops	Trimco	Hager, Ives, Rockwood
Flush Bolts	Trimco	Hager, Ives, Rockwood
Coordinator & Brackets	Trimco	Hager, Ives Rockwood
Threshold & Gasketing	National Guard	Pemko, Reese, Zero
Power Supplies	Precision	Corbin Russwin, Von Duprin

## 2.2 MATERIALS:

- A. Hinges: Shall be Five Knuckle Ball bearing hinges
1. Template screw hole locations
  2. Bearings are to be fully hardened.
  3. Bearing shell is to be consistent shape with barrel.
  4. Minimum of 2 permanently lubricated non-detachable bearings on standard weight hinge and 4 permanently lubricated bearing on heavy weight hinges.
  5. Equip with easily seated, non-rising pins.
  6. Non Removable Pin screws shall be slotted stainless steel screws.
  7. Hinges shall be full polished, front, back and barrel.

8. Hinge pin is to be fully plated.
9. Bearing assembly is to be installed after plating.
10. Sufficient size to allow 180-degree swing of door
11. Furnish five knuckles with flush ball bearings
12. Provide hinge type as listed in schedule.
13. Furnish 3 hinges per leaf to 7 foot 6 inch height. Add one for each additional 30 inches in height or fraction thereof.
14. Tested and approved by BHMA for all applicable ANSI Standards for type, size, function and finish
15. UL10C listed for Fire rated doors.
16. Approved Manufacturers
  - 1) **Stanley**
  - 2) Hager
  - 3) Ives
  - 4) McKinney

B. Geared Continuous Hinges:

1. Tested and approved by BHMA for ANSI A156.26-1996 Grade 1
2. Anti-spinning through fastener
3. UL10C listed for 3 hour Fire rating
4. Non-handed
5. Lifetime warranty
6. Provide Fire Pins for 3-hour fire ratings
7. Sufficient size to permit door to swing 180 degrees
8. Approved Manufacturers
  - 1) **Best 9K Series**
  - 2) Corbin Russwin CL3300 Series
  - 3) Sargent 10 Line
  - 4) Schlage ND Series

C. Electrified Functions for Hinges: Comply with the following:

1. Power Transfer: Concealed PTFE-jacketed wires, secured at each leaf and continuous through hinge knuckle. Provide wire quantity and sizes required for electric hardware be served.

D. Cylindrical Type Locks and Latchsets:

1. Tested and approved by BHMA for ANSI A156.2, Series 4000, Operational Grade 1, Extra-Heavy Duty, and be UL10C listed.
2. Provide 9001-Quality Management and 14001-Environmental Management.
3. Fit modified ANSI A115.2 door preparation.
4. Locksets and cores to be of the same manufacturer to maintain complete lockset warranty
5. Locksets to have anti-rotational studs that are thru-bolted
6. Keyed lever shall not have exposed "keeper" hole
7. Each lever to have independent spring mechanism controlling it
8. 2-3/4 inch (70 mm) backset
9. 9/16 inch (14 mm) throw latchbolt
10. Provide sufficient curved strike lip to protect door trim
11. Outside lever sleeve to be seamless, of one-piece construction made of a hardened steel alloy
12. Keyed lever to be removable only after core is removed, by authorized control key
13. Provide locksets with 7-pin removable and interchangeable core cylinders
14. Hub, side plate, shrouded rose, locking pin to be a one-piece casting with a shrouded locking lug.



15. Locksets outside locked lever must withstand minimum 1400 inch pounds of torque. In excess of that, a replaceable part will shear. Key from outside and inside lever will still operate lockset.
16. Core face must be the same finish as the lockset.
17. Functions and design as indicated in the hardware groups.
18. Approved Manufacturers
  - 1) **Best 9K Series**
  - 2) Corbin Russwin CL3300 Series
  - 3) Sargent 10 Line
  - 4) Schlage ND Series

E. Exit Devices shall be:

1. Tested and approved by BHMA for ANSI 156.3, Grade 1
2. Provide 9001-Quality Management and 14001-Environmental Management.
3. Furnish UL or recognized independent laboratory certified mechanical operational testing to 10 million cycles minimum.
4. Provide a deadlocking latchbolt
5. Non-fire rated exit devices shall have cylinder dogging.
6. Touchpad shall be "T" style
7. Exposed components shall be of architectural metals and finishes.
8. Lever design shall match lockset lever design
9. Provide strikes as required by application.
10. Fire exit devices to be listed for UL10C
11. UL listed for Accident Hazard
12. Shall consist of a cross bar or push pad, the actuating portion of which extends across, shall not be less than one half the width of the door leaf.
13. Provide vandal resistant or breakaway trim
14. Aluminum vertical rod assemblies are acceptable only when provide with the manufacturers optional top and bottom stainless steel rod guard protectors.
15. Approved Manufacturers
  - 1) **Precision Apex 2000 Series**
  - 2) Von Duprin 98/99 Series
  - 3) Corbin Russwin ED5200

F. Cylinders:

1. Provide the necessary cylinder housings, collars, rings & springs as recommended by the manufacturer for proper installation.
2. Provide the proper cylinder cams or tail piece as required to operate all locksets and other keyed hardware items listed in the hardware sets.
3. Coordinate and provide as required for related sections.
4. All cylinders need to be able to accept 7-pin small format interchangeable core SFIC 7-pin Best Cormax cores

G. Door Closers shall:

1. Tested and approved by BHMA for ANSI 156.4, Grade 1
2. UL10C certified
3. Provide 9001-Quality Management and 14001-Environmental Management.
4. Closer shall have extra-duty arms and knuckles
5. Conform to ANSI 117.1
6. Maximum 2 7/16 inch case projection with non-ferrous cover
7. Separate adjusting valves for closing and latching speed, and backcheck
8. Provide adapter plates, shim spacers and blade stop spacers as required by frame and door conditions
9. Full rack and pinion type closer with 1½" minimum bore

10. Mount closers on non-public side of door, unless otherwise noted in specification
  11. Closers shall be non-handed, non-sized and multi-sized.
  12. Approved Manufacturers
    - 1) **Stanley 100 Series**
    - 2) LCN 4040XP Series
    - 3) Norton 7500 Series
- H. Door Stops: Provide a dome floor or wall stop for every opening as listed in the hardware sets.
1. Wall stop and floor stop shall be wrought bronze, brass or stainless steel.
  2. Provide fastener suitable for wall construction.
  3. Coordinate reinforcement of walls where wall stop is specified.
  4. Provide dome stops where wall stops are not practical. Provide spacers or carpet riser for floor conditions encountered
  5. Approved Manufacturers
    - 1) **Trimco**
    - 2) Hager
    - 3) Ives
    - 4) Rockwood
- I. Overhead Stops: Provide a Surface mounted or concealed overhead when a floor or wall stop cannot be used or when listed in the hardware set.
1. Concealed overhead stops shall be heavy duty bronze or stainless steel.
  2. Surface overhead stops shall be heavy duty bronze or stainless steel.
  3. Approved Manufacturers
    - 1) **ABH 1000 Series**
    - 2) Dorma 910 Series
    - 3) Glynn Johnson 100 Series
    - 4) Sargent 690 Series
- J. Push Plates: Provide with four beveled edges ANSI J301, .050 thickness, size as indicated in hardware set. Furnish oval-head countersunk screws to match finish.
1. Approved Manufacturers
    - 1) **Trimco**
    - 2) Hager
    - 3) Ives
    - 4) Rockwood
- K. Pulls with plates: Provide with four beveled edges ANSI J301, .050 thickness Plates with ANSI J401 Pull as listed in hardware set. Provide proper fasteners for door construction.
1. Approved Manufacturers
    - 1) **Trimco**
    - 2) Hager
    - 3) Ives
    - 4) Rockwood
- L. Push Pull Bars: Provide ANSI J504, .1" Dia. Pull and push bar model and series as listed in hardware set. Provide proper fasteners for door construction.
1. Approved Manufacturers
    - 1) **Trimco**
    - 2) Hager
    - 3) Ives
    - 4) Rockwood

- M. Kickplates: Provide with four beveled edges ANSI J102, 10 inches high by width less 2 inches on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.
1. Approved Manufacturers
    - 1) **Trimco**
    - 2) Hager
    - 3) Ives
    - 4) Rockwood
- N. Mop plates: Provide with four beveled edges ANSI J103, 6 inches high by width less 1 inch on single doors and 1 inch on pairs of doors. Furnish oval-head countersunk screws to match finish.
1. Approved Manufacturers
    - 1) **Trimco**
    - 2) Hager
    - 3) Ives
    - 4) Rockwood
- O. Door Bolts: Flush bolts for wood or metal doors.
1. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 25 for hollow metal label doors.
  2. Provide a set of Automatic bolts, Certified ANSI/BHMA 156.3 Type 27 at wood label doors.
  3. Manual flush bolts, Certified ANSI/BHMA 156.16 at openings where allowed local authority.
  4. Provide Dust Proof Strike, Certified ANSI/BHMA 156.16 at doors with flush bolts without thresholds.
  5. Approved Manufacturers
    - 1) **Trimco**
    - 2) Hager
    - 3) Ives
    - 4) Rockwood
- P. Coordinator and Brackets: Provide a surface mounted coordinator when automatic bolts are used in the hardware set.
1. Coordinator, Certified ANSI/BHMA A1156.3 Type 21A for full width of the opening.
  2. Provide mounting brackets for soffit applied hardware.
  3. Provide hardware preparation (cutouts) for latches as necessary.
  4. Approved Manufacturers
    - 1) **Trimco**
    - 2) Hager
    - 3) Ives
    - 4) Rockwood
- Q. Power Supply: PS160 Use with a variety of applications including Electric Locking and Exit Alarm The power supply uses 120 VAC at 0.8 amp input. A 230 VAC at 0.3 ampere is available. The filtered and regulated output power is field selectable for 12 or 24 VDC at 2 amps.
1. Fire Alarm release that accepts normally closed contact
  2. AC input is protected via a manually reset circuit breaker
  3. DC output is protected via an auto-reset fuse (PTC)
  4. Box shall include a key lock.
- R. Seals: All seals shall be finished to match adjacent frame color. Seals shall be furnished as listed in schedule. Material shall be UL listed for labeled openings.

1. Approved Manufacturers
  - 1) **Trimco 5050 CL**
  - 2) Pemko S88
  - 3) Reese 797
  - 4) Zero 188
- S. Weatherstripping: Provide at head and jambs only those units where resilient or flexible seal strip is easily replaceable. Where bar-type weatherstrip is used with parallel arm mounted closers install weatherstrip first.
  1. Weatherstrip shall be resilient seal of Neoprene, Polyurethane, Pile, Nylon Brush or Silicone
  2. UL10C Positive Pressure rated seal set when required.
  3. Approved Manufacturers
    - 1) **Trimco**
    - 2) Pemko
    - 3) Reese
    - 4) Zero
- T. Door Bottoms/Sweeps: Surface mounted or concealed door bottom where listed in the hardware sets.
  1. Door seal shall be resilient seal of Neoprene, Polyurethane, Nylon Brush or Silicone
  2. UL10C Positive Pressure rated seal set when required.
  3. Approved Manufacturers
    - 1) **Trimco**
    - 2) Pemko
    - 3) Reese
    - 4) Zero
- U. Thresholds: Thresholds shall be aluminum beveled type with maximum height of ½" for conformance with ADA requirements. Furnish as specified and per details. Provide fasteners and screws suitable for floor conditions.
  1. Approved Manufacturers
    - 1) **Trimco**
    - 2) Pemko
    - 3) Reese
    - 4) Zero
- V. Silencers: Furnish silencers on all interior frames, 3 for single doors, 2 for pairs. Omit where any type of seals occur.
- W. Key Control System:
  1. BHMA Grade 1 with key holding hooks, labels, two sets of key tags with self-locking key holders, key gathering envelopes and temporary and permanent markers
  2. Wall mounted metal key cabinet with baked enamel finish and hinged panel door with pin tumbler and cylinder door lock.
  3. Capacity for 150 percent of the number of locks and cylinders.
  4. Cabinet to include three-way indexing paper schedules in a hard bound binder.
  5. Approved Manufacturers
    - 1) **Lund**
    - 2) Aladdin
    - 3) Telkee

**2.3 FINISH:**

- A. Designations used in Schedule of Finish Hardware - 3.05, and elsewhere to indicate hardware finishes are those listed in ANSI/BHMA A156.18 including coordination with traditional U.S. finishes shown by certain manufacturers for their products
- B. Powder coat door closers to match other hardware, unless otherwise noted.
- C. Aluminum items shall be finished to match predominant adjacent material. Seals to coordinate with frame color.

**2.4 KEYS AND KEYING:**

- A. Provide keyed brass construction cores and keys during the construction period. Construction control and operating keys and core shall not be part of the Owner's permanent keying system or furnished in the same keyway (or key section) as the Owner's permanent keying system. Permanent cores and keys (prepared according to the accepted keying schedule) will be furnished to the Owner.
- B. Cylinders, removable and interchangeable core system: Best CORMAX™ Patented 7-pin.
- C. Permanent keys and cores: Stamped with the applicable key mark for identification. These visual key control marks or codes will not include the actual key cuts. Permanent keys will also be stamped "Do Not Duplicate."
- D. Deliver grand masterkeys, masterkeys and other permanent keys and cores to Owner at the address on file via secure shipment direct from the key and core manufacturer.
- E. Furnish keys in the following quantities:
  - 1. 1 each Grand Masterkeys
  - 2. 4 each Masterkeys
  - 3. 2 each Change keys each keyed core
  - 4. 15 each Construction masterkeys
  - 5. 1 each Control keys
- F. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the Hardware Supplier. Construction cores and keys remain the property of the Hardware Supplier.
- G. Keying Schedule: Arrange for a keying meeting, and programming meeting with Architect Owner and hardware supplier, and other involved parties to ensure locksets and locking hardware, are functionally correct and keying and programming complies with project requirements. Furnish 3 typed copies of keying and programming schedule to Architect.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Verification of conditions: Examine doors, frames, related items and conditions under which Work is to be performed and identify conditions detrimental to proper and or timely completion.
  - 1. Do not proceed until unsatisfactory conditions have been corrected.

### 3.2 HARDWARE LOCATIONS:

- A. Mount hardware units at heights indicated in the following publications except as specifically indicated or required to comply with the governing regulations.
  - 1. Recommended Locations for Builder's Hardware for Standard Steel Doors and Frames, by the Door and Hardware Institute (DHI).
  - 2. Recommended locations for Architectural Hardware for flush wood doors (DHI).
  - 3. WDMA Industry Standard I.S.-1A-04, Industry Standard for Architectural wood flush doors.

### 3.3 INSTALLATION:

- A. Install each hardware item per manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
- B. Conform to local governing agency security ordinance.
- C. Install Conforming to ICC/ANSI A117.1 Accessible and Usable Building and Facilities.
  - 1. Adjust door closer sweep periods so that from the open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches from the latch, measured to the landing side of the door.
- D. Installed hardware using the manufacturers fasteners provided. Drill and tap all screw holes located in metallic materials. Do not use "Riv-Nuts" or similar products.

### 3.4 FIELD QUALITY CONTROL AND FINAL ADJUSTMENT

- A. Contractor/Installers, Field Services: After installation is complete, contractor shall inspect the completed door openings on site to verify installation of hardware is complete and properly adjusted, in accordance with both the Contract Documents and final shop drawings.
  - 1. Check and adjust closers to ensure proper operation.
  - 2. Check latchset, lockset, and exit devices are properly installed and adjusted to ensure proper operation.
    - a. Verify levers are free from binding.
    - b. Ensure latchbolts and dead bolts are engaged into strike and hardware is functioning.
  - 3. Report findings, in writing, to architect indicating that all hardware is installed and functioning properly. Include recommendations outlining corrective actions for improperly functioning hardware if required.
  - 4. Approximately six (6) months after substantial completion of the project a factory representative of the provided material shall perform a jobsite walk through. Attendees shall include the Owner, Security Vendor and Contractor; attendance by the installer is at the discretion of the Contractor. This will be done to determine if products are performing as recommended by the manufacturer and meet all fire and life safety requirements. Deficiencies due to installation shall be corrected by the General Contractor and defective material shall be replaced by the Hardware Distributor.

## 3.5 SCHEDULE OF FINISH HARDWARE:

**Option List**

<b><u>Code</u></b>	<b><u>Description</u></b>
C	QUICK CONNECT WIRING OPTION
18	CONCEALED WIRES - 18 AWG (2)
C4	CAM-STANDARD CAM
CD	CYLINDER DOGGING
CE	CONCEALED /WIRES
CS	CUSHION STOP
DS	DOOR POSITION SWITCH
FL	FIRE EXIT HARDWARE
LD	LESS DOGGING
PT	POWER TRANSFER
S3	ANSI Strike Package
TS	TOUCHBAR MONITORING SWITCH
36"	36" Door Width
3RO	Prefix option for 2000 Apex Series
B4E	BEVELED 4 EDGES - KICK PLATES
CSK	COUNTER SINKI KICK and MOP PLATES
FSE	FAIL SECURE
MLR	MOTORIZED LATCH RETRACTION
RQE	REQUEST TO EXIT
TL/O	TACTILE LEVER - Outside
4' LONG WIRES	EXTRA LONG WIRES (4')
1/4-20 SSMS/EA	SS MACH SCREWS/EXPAN. ANCHOR

**Finish List**

<b><u>Code</u></b>	<b><u>Description</u></b>
AL	Aluminum
600	Primed for Painting
626	Satin Chromium Plated
630	Satin Stainless Steel
689	Aluminum Painted
GREY	Grey
BLACK	Black
US26D	Chromium Plated, Dull
US32D	Stainless Steel, Dull

**Hardware Sets**

**SET #1 - AC AL EXTER PR ED ADA**

Doors: 101

2	Continuous Hinge	A111HDC 95 CUT TO CUSTOM LENGTH PT	
AB			
2	Power Transfer	EPT-12C	
PR			
1	Removable Mullion	KR822	600
PR			
1	Exit Device	3RO C MLR TS 2102 X 2002C 36" DS FSE LD	630
PR			
1	Exit Device	3RO C MLR TS 2103 X 2003C 36" DS FSE LD	630
PR			
2	Rim Cylinder	12E-72 PATD	626
BE			
2	Auto Operator	BY SECTION 087113	689
BY			
2	Push Plate Actuator	BY SECTION 087113	
BY			
2	Kick Plate	K0050 10" x 34" B4E CSK	630
TR			
1	Gasketing & Sweep(s)	BY ALUMINUM DOOR MANUFACTURER	
BY			
1	Threshold	8425 72" 1/4-20 SSMS/EA	AL
NA			
2	Wire Harness	WH-XX SIZE AS REQUIRED	
ST			
2	Wire Harness	WH-XX SIZE AS REQUIRED	
ST			
1	Power Supply	BY OWNER'S SECURITY CONTRACTOR	
BY			
1	Card Reader	BY OWNER'S SECURITY CONTRACTOR	
BY			
1	Video Intercom System	OWNER'S STANDARD	
BY			
1	Remote Release	BY OWNER'S SECURITY PROVIDER	
BY			
1	Wiring Diagram	BY HARDWARE SUPPLIER	
BY			

NOTE: COORDINATION WITH ELECTRICAL AND SECURITY REQUIRED.

OPERATION DESCRIPTION: Door normally closed, latched and secure. Momentary access by presenting valid credential to reader, by remote release or by mechanical key override. With loss of power door will remain locked. Immediate free egress at all times.

**SET #2 - AC AL INTER PR ED**

Doors: 101A

2	Continuous Hinge	A111HDC 95 CUT TO CUSTOM LENGTH PT	
AB			



2	Power Transfer	EPT-12C	
PR			
1	Removable Mullion	KR822	600
PR			
1	Exit Device	3RO C MLR TS 2102 X 2002C 36" DS FSE LD	630
PR			
1	Exit Device	3RO C MLR TS 2103 X 2003C 36" DS FSE LD	630
PR			
2	Rim Cylinder	12E-72 PATD	626
BE			
2	Door Closer	QDC115	689
SH			
2	Overhead Stop	1023	US32D
AB			
2	Kick Plate	K0050 10" x 34" B4E CSK	630
TR			
1	Gasketing	BY ALUMINUM DOOR MANUFACTURER	
BY			
1	Card Reader	BY OWNER'S SECURITY CONTRACTOR	
BY			
1	Remote Release	BY OWNER'S SECURITY PROVIDER	
BY			
2	Wire Harness	WH-XX SIZE AS REQUIRED	
ST			
2	Wire Harness	WH-XX SIZE AS REQUIRED	
ST			
1	Power Supply	BY OWNER'S SECURITY CONTRACTOR	
BY			
1	Wiring Diagram	BY HARDWARE SUPPLIER	
BY			

NOTE: COORDINATION WITH ELECTRICAL AND SECURITY REQUIRED.

OPERATION DESCRIPTION: Door normally closed, latched and secure. Momentary access by presenting valid credential to reader, by remote release or by mechanical key override. With loss of power door will remain locked. Immediate free egress at all times.

### SET #3 - AC AL EXTER ED

Doors: 136A, 122

1	Continuous Hinge	A111HDC 95 CUT TO CUSTOM LENGTH PT	
AB			
1	Power Transfer	EPT-12C	
PR			
1	Exit Device	3RO C MLR TS 2103 X 2003C 36" DS FSE LD	630
PR			
1	Rim Cylinder	12E-72 PATD	626
BE			
1	Door Closer	QDC115	689
SH			
1	Overhead Stop	1023	US32D
AB			
1	Kick Plate	K0050 10" x 34" B4E CSK	630
TR			

1	Gasketing & Sweep(s)	BY ALUMINUM DOOR MANUFACTURER	
BY			
1	Threshold	8425 72" 1/4-20 SSMS/EA	AL
NA			
1	Wire Harness	WH-XX SIZE AS REQUIRED	
ST			
1	Wire Harness	WH-XX SIZE AS REQUIRED	
ST			
1	Card Reader	BY OWNER'S SECURITY CONTRACTOR	
BY			
1	Power Supply	BY OWNER'S SECURITY CONTRACTOR	
BY			
1	Wiring Diagram	BY HARDWARE SUPPLIER	
BY			

NOTE: COORDINATION WITH ELECTRICAL AND SECURITY REQUIRED.

OPERATION DESCRIPTION: Door normally closed, latched and secure. Momentary access by presenting valid credential to reader or by mechanical key override. With loss of power door will remain locked. Immediate free egress at all times.

#### SET #4 - AC HM EXTER ED

Doors: 146, 149

2	Hinges	CB199 4 1/2 X 4 1/2 NRP	US32D
ST			
1	Hinges	CE CB199 4 1/2 X 4 1/2 18	US32D
ST			
1	Exit Device	3RO C MLR TS 2103 X 2003C 36" DS FSE LD	630
PR			
1	Rim Cylinder	12E-72 PATD	626
BE			
1	Door Closer w/ Stop	QDC119	689
SH			
1	Kick Plate	K0050 10" x 34" B4E CSK	630
TR			
1	Door Stop	1209	630
TR			
1	Drip Cap	16 A - 4" ODW	
NA			
1	Gasketing	5050 CL	
NA			
1	Door Sweep	200 NA	
NA			
1	Threshold	8425 36" 1/4-20 SSMS/EA	AL
NA			
1	Wire Harness	WH-XX SIZE AS REQUIRED	
ST			
1	Wire Harness	WH-XX SIZE AS REQUIRED	
ST			
1	Card Reader	BY OWNER'S SECURITY CONTRACTOR	
BY			
1	Power Supply	BY OWNER'S SECURITY CONTRACTOR	
BY			

1 Wiring Diagram BY HARDWARE SUPPLIER  
BY

NOTE: COORDINATION WITH ELECTRICAL AND SECURITY REQUIRED.

OPERATION DESCRIPTION: Door normally closed, latched and secure. Momentary access by presenting valid credential to reader or by mechanical key override. With loss of power door will remain locked. Immediate free egress at all times.

#### SET #5 - AC EXTER ED

Doors: 103A, 109A, 125, 151, 151A

2 Hinges	CB199 4 1/2 X 4 1/2 NRP	US32D
ST		
1 Hinges	CE CB199 4 1/2 X 4 1/2 18	US32D
ST		
1 Exit Device	3RO C E2103 X V4908D 36" DS FSE LD	630
PR		
1 Door Closer w/ Stop	QDC119	689
SH		
1 Kick Plate	K0050 10" x 34" B4E CSK	630
TR		
1 Door Stop	1209	630
TR		
1 Drip Cap	16 A - 4" ODW	
NA		
1 Gasketing	5050 CL	
NA		
1 Door Sweep	200 NA	
NA		
1 Threshold	8425 36" 1/4-20 SSMS/EA	AL
NA		
1 Wire Harness	WH-XX SIZE AS REQUIRED	
ST		
1 Wire Harness	WH-XX SIZE AS REQUIRED	
ST		
1 Card Reader	BY OWNER'S SECURITY CONTRACTOR	
BY		
1 Power Supply	BY OWNER'S SECURITY CONTRACTOR	
BY		
1 Wiring Diagram	BY HARDWARE SUPPLIER	
BY		

NOTE: COORDINATION WITH ELECTRICAL AND SECURITY REQUIRED.

OPERATION DESCRIPTION: Door normally closed, latched and secure. Momentary access by presenting valid credential to reader or by mechanical key override. With loss of power door will remain locked. Immediate free egress at all times.

#### SET #6 - AC EXTER STOR OS

Doors: 112A

3 Hinges	CB199 4 1/2 X 4 1/2 NRP	US32D
ST		
1 Hinges	CE CB199 4 1/2 X 4 1/2 18 4' LONG WIRES	US32D
ST		
1 Electro-mech Lock	9KW3-7DEU14C PATD C RQE S3	626
BE		
1 Door Closer	QDC115	689
SH		
1 Door Stop	1209	630
TR		
1 Drip Cap	16 A - 4" ODW	
NA		
1 Gasketing	5050 CL	
NA		
1 Door Sweep	200 NA	
NA		
1 Threshold	8425 36" 1/4-20 SSMS/EA	AL
NA		
1 Door Position Switch	MC-4	
SDCO		
1 Wire Harness	WH-XX SIZE AS REQUIRED	
ST		
1 Wire Harness	WH-XX SIZE AS REQUIRED	
ST		
1 Card Reader	BY OWNER'S SECURITY CONTRACTOR	
BY		
1 Power Supply	BY OWNER'S SECURITY CONTRACTOR	
BY		
1 Wiring Diagram	BY HARDWARE SUPPLIER	
BY		

NOTE: COORDINATION WITH ELECTRICAL AND SECURITY REQUIRED.

OPERATION DESCRIPTION: Door normally closed, latched and secure. Momentary access by presenting valid credential to reader or by mechanical key override. With loss of power door will remain locked. Immediate free egress at all times.

#### SET #7 - AC EXTER STOR OS

Doors: 152

2 Hinges	CB191 4 1/2 X 4 1/2 NRP	US32D
ST		
1 Hinges	CE CB191 4 1/2 X 4 1/2 18 4' LONG WIRES	US32D
ST		
1 Electro-mech Lock	9KW3-7DEU14C PATD C RQE S3	626
BE		
1 Door Closer	QDC115	689
SH		
1 Door Stop	1209	630
TR		
1 Drip Cap	16 A - 4" ODW	
NA		

1	Gasketing	5050 CL	
NA			
1	Door Sweep	200 NA	
NA			
1	Threshold	8425 36" 1/4-20 SSMS/EA	AL
NA			
1	Door Position Switch	MC-4	
SDCO			
1	Wire Harness	WH-XX SIZE AS REQUIRED	
ST			
1	Wire Harness	WH-XX SIZE AS REQUIRED	
ST			
1	Card Reader	BY OWNER'S SECURITY CONTRACTOR	
BY			
1	Power Supply	BY OWNER'S SECURITY CONTRACTOR	
BY			
1	Wiring Diagram	BY HARDWARE SUPPLIER	
BY			

NOTE: COORDINATION WITH ELECTRICAL AND SECURITY REQUIRED.

OPERATION DESCRIPTION: Door normally closed, latched and secure. Momentary access by presenting valid credential to reader or by mechanical key override. With loss of power door will remain locked. Immediate free egress at all times.

#### SET #8 - AC STORERM

Doors: 141

2	Hinges	CB191 4 1/2 X 4 1/2	US32D
ST			
1	Hinges	CE CB191 4 1/2 X 4 1/2 18 4' LONG WIRES	US32D
ST			
1	Electro-mech Lock	9KW3-7DEU14C PATD C RQE S3	626
BE			
1	Floor Stop	1211	626
TR			
1	Gasketing	5050 CL	
NA			
1	Door Sweep	200 NA	
NA			
1	Door Position Switch	MC-4	
SDCO			
1	Wire Harness	WH-XX SIZE AS REQUIRED	
ST			
1	Wire Harness	WH-XX SIZE AS REQUIRED	
ST			
1	Card Reader	BY OWNER'S SECURITY CONTRACTOR	
BY			
1	Power Supply	BY OWNER'S SECURITY CONTRACTOR	
BY			
1	Wiring Diagram	BY HARDWARE SUPPLIER	
BY			

NOTE: Verify that Door Closer is not required on Access Controlled Opening; normally provided as "Best Practice".

NOTE: COORDINATION WITH ELECTRICAL AND SECURITY REQUIRED.

OPERATION DESCRIPTION: Door normally closed, latched and secure. Momentary access by presenting valid credential to reader or by mechanical key override. With loss of power door will remain locked. Immediate free egress at all times.

#### SET #9 - AC STORERM OS

Doors: 201

2 Hinges	CB191 4 1/2 X 4 1/2 NRP	US32D
ST		
1 Hinges	CE CB191 4 1/2 X 4 1/2 18 4' LONG WIRES	US32D
ST		
1 Electro-mech Lock	9KW3-7DEU14C PATD C RQE S3	626
BE		
1 Door Closer w/ Stop	QDC113	689
SH		
1 Kick Plate	K0050 10" x 34" B4E CSK	630
TR		
1 Gasketing	5050 CL	
NA		
1 Door Sweep	200 NA	
NA		
1 Threshold	8425 36" 1/4-20 SSMS/EA	AL
NA		
1 Wire Harness	WH-XX SIZE AS REQUIRED	
ST		
1 Wire Harness	WH-XX SIZE AS REQUIRED	
ST		
1 Card Reader	BY OWNER'S SECURITY CONTRACTOR	
BY		
1 Power Supply	BY OWNER'S SECURITY CONTRACTOR	
BY		
1 Wiring Diagram	BY HARDWARE SUPPLIER	
BY		

NOTE: COORDINATION WITH ELECTRICAL AND SECURITY REQUIRED.

OPERATION DESCRIPTION: Door normally closed, latched and secure. Momentary access by presenting valid credential to reader or by mechanical key override. With loss of power door will remain locked. Immediate free egress at all times.

#### SET #10 - AC APBAY STOR OS

Doors: 119A

3 Hinges	CB191 4 1/2 X 4 1/2 NRP	US32D
ST		
1 Hinges	CE CB191 4 1/2 X 4 1/2 18 4' LONG WIRES	US32D
ST		

1	Electro-mech Lock	9KW3-7DEU14C PATD C RQE S3	626
BE			
1	Door Closer	QDC115	689
SH			
1	Kick Plate	K0050 10" x 34" B4E CSK	630
TR			
1	Door Stop	1209	630
TR			
1	Gasketing	5050 CL	
NA			
1	Door Sweep	200 NA	
NA			
1	Threshold	8425 36" 1/4-20 SSMS/EA	AL
NA			
1	Door Position Switch	MC-4	
SDCO			
1	Wire Harness	WH-XX SIZE AS REQUIRED	
ST			
1	Wire Harness	WH-XX SIZE AS REQUIRED	
ST			
1	Card Reader	BY OWNER'S SECURITY CONTRACTOR	
BY			
1	Power Supply	BY OWNER'S SECURITY CONTRACTOR	
BY			
1	Wiring Diagram	BY HARDWARE SUPPLIER	
BY			

NOTE: COORDINATION WITH ELECTRICAL AND SECURITY REQUIRED.

OPERATION DESCRIPTION: Door normally closed, latched and secure. Momentary access by presenting valid credential to reader or by mechanical key override. With loss of power door will remain locked. Immediate free egress at all times.

#### SET #11 - AL PR ED ADA

Doors: 103

2	Continuous Hinge	A111HDC 95 CUT TO CUSTOM LENGTH	
AB			
1	Exit Device	3RO 2803 X C1703C 36" CD Spec. Bar Height	630
PR			
1	Exit Device	3RO 2802 X C1702C 36" CD Spec. Bar Height	630
PR			
1	Rim Cylinder	12E-72 PATD	626
BE			
2	Mortise Cylinder	1E-74 PATD C4	626
BE			
		NOTE: For Cylinder Dogging	
2	Door Closer w/ H.O.	TS9315 PTH CS	689
DM			
2	Kick Plate	K0050 10" x 35" B4E CSK	630
TR			
1	Gasketing	BY ALUMINUM DOOR MANUFACTURER	
BY			

**SET #12 - PR AL P-P**

Doors: 139

2	Continuous Hinge	A111HDC 83	
AB			
2	Push/Pull Set	1738 33"	630
TR			
2	Door Closer	QDC111	689
SH			
2	Drop Plate	8Q00470 w/Screw Pack	689
SH			
1	Overhead Stop	1023	US32D
AB			
		NOTE: Install on LH Door	
2	Kick Plate	K0050 10" x 34" B4E CSK	630
TR			
1	Floor Stop	1211	626
TR			
2	Gasketing	BY ALUMINUM DOOR MANUFACTURER	
BY			

**SET #13 - ED ELEC**

Doors: 203

3	Hinges	CB191 4 1/2 X 4 1/2 NRP	US32D
ST			
1	Exit Device	3RO FL 2103 X 4903D 36"	630
PR			
1	Rim Cylinder	12E-72 PATD	626
BE			
1	Door Closer w/ Stop	QDC113	689
SH			
1	Kick Plate	K0050 10" x 34" B4E CSK	630
TR			
1	Gasketing	5050 CL	
NA			
1	Door Sweep	200 NA	
NA			
1	Threshold	8425 36" 1/4-20 SSMS/EA	AL
NA			

**SET #14 - APBAY RAMP ED**

Doors: 143, 140

3	Hinges	CB199 4 1/2 X 4 1/2 NRP	US32D
ST			
1	Exit Device	3RO 2108 X V4908D 36"	630
PR			
1	Rim Cylinder	12E-72 PATD	626
BE			
1	Door Closer	QDC115	689
SH			



1 Kick Plate	K0050 10" x 34" B4E CSK	630
TR		
1 Wall Bumper	1270WX	626
TR		
1 Gasketing	5050 CL	
NA		
1 Door Sweep	200 NA	
NA		
1 Threshold	8425 36" 1/4-20 SSMS/EA	AL
NA		

**SET #15 - APBAY TEMP ED**

Doors: TP-2, TP-1

3 Hinges	CB199 4 1/2 X 4 1/2	US32D
ST		
1 Exit Device	3RO 2114 X 4914D 36"	630
PR		
1 Door Closer	QDC115	689
SH		
1 Kick Plate	K0050 10" x 34" B4E CSK	630
TR		
1 Wall Bumper	1270WX	626
TR		
1 Gasketing	5050 CL	
NA		
1 Door Sweep	200 NA	
NA		
1 Threshold	8425 36" 1/4-20 SSMS/EA	AL
NA		

**SET #16 - APBAY STORE OS STAIR ETR MECH**

Doors: 144

3 Hinges	CB191 4 1/2 X 4 1/2 NRP	US32D
ST		
1 Storeroom Lock TL/O	9K3-7D14C PATD S3 TL/O	626
BE		
1 Door Closer	QDC115	689
SH		
1 Kick Plate	K0050 10" x 34" B4E CSK	630
TR		
1 Wall Bumper	1270WX	626
TR		
1 Gasketing	5050 CL	
NA		

**SET #17 - APBAY STORE OS STAIR**

Doors: 144A

3 Hinges	CB191 4 1/2 X 4 1/2 NRP	US32D
ST		
1 Storeroom Lock TL/O	9K3-7D14C PATD S3 TL/O	626
BE		
1 Door Closer	QDC115	689
SH		
1 Kick Plate	K0050 10" x 34" B4E CSK	630
TR		
1 Wall Bumper	1270WX	626
TR		
1 Gasketing	5050 CL	
NA		

**SET #18 - APBAY PR STOR IS SCBA**

Doors: 150

6 Hinges	CB199 4 1/2 X 4 1/2	US32D
ST		
1 Set Semi-Auto Flush Bolts	3820 X 3810	630
TR		
1 Dustproof Strike	3910	630
TR		
1 Storeroom Lock	9K3-7D14C PATD S3	626
BE		
2 Overhead Stop	1023	US32D
AB		
1 Door Closer	QDC111	689
SH		
2 Kick Plate	K0050 10" x 35" B4E CSK	630
TR		
1 Astragal	BY DOOR MFG	
BY		
2 Door Silencers	1229A	GREY
TR		

**SET #19 - PR STOR MECH**

Doors: 202

6 Hinges	CB199 4 1/2 X 4 1/2	US32D
ST		
1 Set Semi-Auto Flush Bolts	3820 X 3810	630
TR		
1 Dustproof Strike	3910	630
TR		
1 Storeroom Lock	9K3-7D14C PATD S3	626
BE		
1 Coordinator	3092	BLACK
TR		
2 Door Closer	QDC111	689
SH		
1 Astragal	BY DOOR MFG	
BY		
2 Door Silencers	1229A	GREY
TR		

**SET #20 - PR STOR MECH**

Doors: 200A

6 Hinges	CB199 4 1/2 X 4 1/2	US32D
ST		
1 Set Semi-Auto Flush Bolts	3820 X 3810	630
TR		
1 Dustproof Strike	3910	630
TR		
1 Storeroom Lock	9K3-7D14C PATD S3	626
BE		
1 Coordinator	3092	BLACK
TR		
2 Door Closer	QDC111	689
SH		
1 Astragal	BY DOOR MFG	
BY		
2 Door Silencers	1229A	GREY
TR		

NOTE: Field verify specified hardware will retrofit existing doors and frame before ordering.

**SET #22 - BUNK ROOM ED 20M**

Doors: 109, 125D, 125E, 125F

3 Hinges	CB168 4 1/2 X 4 1/2	US26D
ST		
1 Exit Device	3RO FL 2114 X 4914D 36"	630
PR		
1 Door Closer	QDC115	689
SH		
1 Kick Plate	K0050 10" x 34" B4E CSK	630
TR		
1 Wall Bumper	1270WX	626
TR		
1 Gasketing	5050 CL	
NA		

**SET #23 - PUSH/ PULL**

Doors: 126, 131

3 Hinges	CB199 4 1/2 X 4 1/2	US32D
ST		
1 Push/Pull Plate Combo	1895-4B	630
TR		
1 Door Closer	QDC115	689
SH		
1 Kick Plate	K0050 10" x 34" B4E CSK	630
TR		
1 Wall Bumper	1270WX	626
TR		

3 Door Silencers TR	1229A	GREY
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**SET #24 - PUSH/ PULL**

Doors: 135A, 135

3 Hinges ST	CB199 4 1/2 X 4 1/2	US32D
1 Push/Pull Set TR	1738 33"	630
1 Door Closer SH	QDC115	689
1 Kick Plate TR	K0050 10" x 34" B4E CSK	630
1 Wall Bumper TR	1270WX	626
3 Door Silencers TR	1229A	GREY

**SET #25 - PUSH/ PULL**

Doors: 147A, 148, 147

3 Hinges ST	CB199 4 1/2 X 4 1/2	US32D
1 Push/Pull Plate Combo TR	1895-4B	630
1 Door Closer SH	QDC115	689
1 Kick Plate TR	K0050 10" x 34" B4E CSK	630
1 Mop Plate TR	KM050 6" x 35" CSK	630
1 Floor Stop TR	1211	626
3 Door Silencers TR	1229A	GREY

**SET #26 - PASSAGE**

Doors: 120

3 Hinges ST	CB179 4 1/2 X 4 1/2	US26D
1 Passage Set BE	9K3-0N14C S3	626
1 Wall Bumper TR	1270WX	626
3 Door Silencers TR	1229A	GREY

**SET #27 - PASSAGE**

Doors: 129

3 Hinges	CB199 4 1/2 X 4 1/2	US32D
ST		
1 Passage Set	9K3-0N14C S3	626
BE		
1 Door Closer	QDC111	689
SH		
1 Kick Plate	K0050 10" x 34" B4E CSK	630
TR		
1 Mop Plate	KM050 6" x 35" CSK	630
TR		
1 Wall Bumper	1270WX	626
TR		
3 Door Silencers	1229A	GREY
TR		

**SET #28 - PASSAGE - ETR DR + FR**

Doors: 200

3 Hinges	CB179 4 1/2 X 4 1/2	US26D
ST		
1 Passage Set	9K3-0N14C S3	626
BE		
1 Door Closer	QDC115	689
SH		
1 Wall Bumper	1270WX	626
TR		
1 Gasketing	5050 CL	
NA		

NOTE: Field verify specified hardware will retrofit existing door and frame before ordering.

**SET #29 - PRIVACY @ TOILET**

Doors: 102, 104

3 Hinges	CB191 4 1/2 X 4 1/2	US32D
ST		
1 Privacy Set	9K3-0L14C S3	626
BE		
1 Door Closer	QDC111	689
SH		
1 Kick Plate	K0050 10" x 34" B4E CSK	630
TR		
1 Mop Plate	KM050 6" x 35" CSK	630
TR		
1 Wall Bumper	1270WX	626
TR		
1 Coat Hook	3071	630
TR		

3 Door Silencers	1229A	GREY
TR		

**SET #30 - PRIVACY @ BUNK**

Doors: 105, 106, 107, 108, 125B, 125C

3 Hinges	CB179 4 1/2 X 4 1/2	US26D
ST		
1 Privacy Set	9K3-0L14C S3	626
BE		
1 Door Closer	QDC111	689
SH		
1 Kick Plate	K0050 10" x 34" B4E CSK	630
TR		
1 Wall Bumper	1270WX	626
TR		
1 Coat Hook	3071	630
TR		
1 Gasketing	5050 CL	
NA		
1 Door Sweep	200 NA	
NA		

NOTE: Door sweeps specified to minimize light and sound from travelling under the doors.  
Please advise if automatic door bottoms are preferred.

**SET #31 - PRIVACY @ BUNK**

Doors: 125A

3 Hinges	CB179 4 1/2 X 4 1/2	US26D
ST		
1 Privacy Set	9K3-0L14C S3	626
BE		
1 Door Closer	QDC111	689
SH		
1 Overhead Stop	1023	US32D
AB		
1 Kick Plate	K0050 10" x 34" B4E CSK	630
TR		
1 Coat Hook	3071	630
TR		
1 Gasketing	5050 CL	
NA		
1 Door Sweep	200 NA	
NA		

**SET #32 - OFFICE**

Doors: 114, 115, 116, 118, 119, 123, 124, 133, 134, 113

3 Hinges	CB179 4 1/2 X 4 1/2	US26D
ST		

1 Office Lock	9K3-7AB14C PATD S3	626
BE		
1 Wall Bumper	1270WX	626
TR		
1 Coat Hook	3071	630
TR		
3 Door Silencers	1229A	GREY
TR		

**SET #33 - CLASSROOM @ PANTRY**

Doors: 137, 137A, 137B, 137C

3 Hinges	CB179 4 1/2 X 4 1/2 NRP	US26D
ST		
1 Classroom Lock	9K3-7R14C PATD S3	626
BE		
1 Wall Bumper	1270WX	626
TR		
3 Door Silencers	1229A	GREY
TR		

NOTE: Omit Wall Stops at 137 and 137C

**SET #34 - INT STORE IS HH WS**

Doors: 112

3 Hinges	CB168 4 1/2 X 4 1/2	US26D
ST		
1 Storeroom Lock	9K3-7D14C PATD S3	626
BE		
1 Wall Bumper	1270WX	626
TR		
3 Door Silencers	1229A	GREY
TR		

**SET #35 - INT STOR OS**

Doors: 121

3 Hinges	CB191 4 1/2 X 4 1/2 NRP	US32D
ST		
1 Storeroom Lock	9K3-7D14C PATD S3	626
BE		
1 Mop Plate	KM050 6" x 34" CSK	630
TR		
	NOTE: Omit at Door 122A	
1 Wall Bumper	1270WX	626
TR		
3 Door Silencers	1229A	GREY
TR		

**SET #36 - INT STOR JAN IS**

## Doors: 128

3 Hinges	CB191 4 1/2 X 4 1/2	US32D
ST		
1 Storeroom Lock	9K3-7D14C PATD S3	626
BE		
1 Mop Plate	KM050 6" x 35" CSK	630
TR		
1 Wall Bumper	1270WX	626
TR		
3 Door Silencers	1229A	GREY
TR		

**SET #37 - INT STORE IS**

## Doors: 130

3 Hinges	CB168 4 1/2 X 4 1/2	US26D
ST		
1 Storeroom Lock	9K3-7D14C PATD S3	626
BE		
1 Wall Bumper	1270WX	626
TR		
3 Door Silencers	1229A	GREY
TR		

**SET #40 - ATTIC STOCK**

## Doors: ATTIC

5 Privacy Set	9K3-0L14C S3	626
BE		
5 Office Lock	9K3-7AB14C PATD S3	626
BE		
5 Classroom Lock	9K3-7R14C PATD S3	626
BE		
5 Storeroom Lock	9K3-7D14C PATD S3	626
BE		
2 Electro-mech Lock	9KW3-7DEU14C PATD C RQE S3	626
BE		
5 Passage Set	9K3-0N14C S3	626
BE		
1 Exit Device	3RO C MLR TS 2103 X 2003C 36" DS FSE LD	630
PR		
1 Exit Device	3RO 2803 X C1703C 36" CD Spec. Bar Height	630
PR		
1 Exit Device	3RO 2101 36" LD	630
PR		
1 Exit Device	3RO 2108 X V4908D 36"	630
PR		
1 Exit Device	3RO FL 2114 X 4914D 36"	630
PR		
1 Exit Device	3RO 2114 X 4914D 36"	630
PR		



5	Rim Cylinder	12E-72 PATD	626
BE			
5	Mortise Cylinder	1E-74 PATD C4	626
BE			
5	Door Closer	QDC111	689
SH			
5	Drop Plate	8Q00470 w/Screw Pack	689
SH			

### Opening List

<u>Opening</u>	<u>Hdw Set</u>	<u>Opening Label</u>	<u>Door Type</u>	<u>Frame</u>
101	1		AL	AL
101A	2		AL	AL
102	29		WD	HM
103	11		AL	AL
103A	5		HM	HM
104	29		WD	HM
105	30	20	WD	HM
106	30	20	WD	HM
107	30	20	WD	HM
108	30	20	WD	HM
109	22	20	WD	HM
109A	5		HM	HM
112	34		WD	HM
112A	6		HM	HM
113	32		WD	HM
114	32		WD	HM
115	32		WD	HM
116	32		WD	HM
118	32		WD	HM
119	32		WD	HM
119A	10		HM	HM
120	26		WD	HM
121	35		WD	HM
122	3		AL	AL
123	32		WD	HM
124	32		WD	HM
125	5		HM	HM
125A	31	20	WD	HM
125B	30	20	WD	HM
125C	30	20	WD	HM
125D	22	20	WD	HM
125E	22	20	WD	HM
125F	22	20	WD	HM
126	23		WD	HM
128	36		WD	HM
129	27		WD	HM

130	37	WD	HM
131	23	WD	HM
133	32	WD	HM
134	32	WD	HM
135	24	WD	HM
135A	24	WD	HM
136A	3	AL	AL
137	33	WD	HM
137A	33	WD	HM
137B	33	WD	HM
137C	33	WD	HM
139	12	AL	AL
140	14	HM	HM
141	8	HM	HM
143	14	HM	HM
144	16	ETR	ETR
144A	17	HM	HM
146	4	HM	HM
147	25	HM	HM
147A	25	HM	HM
148	25	HM	HM
149	4	HM	HM
150	18	HM	HM
151	5	HM	HM
151A	5	HM	HM
152	7	HM	HM
200	28	ETR	ETR
200A	20	ETR	ETR
201	9	HM	HM
202	19	HM	HM
203	13	HM	HM
TP-1	15	HM	HM
TP-2	15	HM	HM
ATTIC	40		

**SECTION 087113**  
**AUTOMATIC DOOR OPERATORS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. This Section includes the following types of automatic door operators:
  - 1. Exterior and interior, automatic door operators, low energy, with visible mounting.
  - 2. Automatic door operators shall be configured for doors as follows:
    - a. Simultaneous pairs, out swing, in swing, or double egress.
    - b. Simultaneous pairs, with single operator, out swing or in swing.
    - c. Single doors, out swing or in swing.
- B. Related Sections:
  - 1. Section 081100 – Metal Doors and Frames
  - 2. Section 084113 – Aluminum Framed Entrances and Storefronts
  - 3. Section 087100 – Finish Hardware.
  - 4. Section 260519 – Low Voltage Electrical Power Conductors and Cables
  - 5. Section 260533 – Raceways and Boxes
  - 6. Section 260553 – Identification Specifications

**1.2 REFERENCES**

- A. General: Standards listed by reference, including revisions by issuing authority, form a part of this specification section to extent indicated. Standards listed are identified by issuing authority, authority abbreviation, designation number, title or other designation established by issuing authority. Standards subsequently referenced herein are referred to by issuing authority abbreviation and standard designation.
- B. Underwriters Laboratories (UL):
  - 1. UL 325 – Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems.
- C. American National Standards Institute (ANSI)/Builders' Hardware Manufacturers Association (BHMA):
  - 1. ANSI/BHMA A156.10: Standard for Power Operated Pedestrian Doors.
  - 2. ANSI/BHMA A156.19: Standard for Power Assist and Low Energy Power Operated Doors.
- D. American Society for Testing and Materials (ASTM):
  - 1. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
  - 2. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
- E. Builders' Hardware Manufacturers Association (BHMA):
  - 1. BHMA A156.10 - Standard for Power Operated Pedestrian Doors.
- F. American Association of Automatic Door Manufacturers (AAADM):
- G. National Fire Protection Association (NFPA):
  - 1. NFPA 101 – Life Safety Code.
  - 2. NFPA 70 – National Electric Code.
- H. International Conference of Building Officials (ICBO):
  - 1. UBC 1997: Uniform Building Code
- I. California Department of Forestry and Fire Protection, Office of the State Fire Marshall.
- J. International Standards Organization (ISO):
  - 1. ISO 9001 - Standard for Manufacturing Quality Management Systems
- K. National Association of Architectural Metal Manufacturers (NAAMM):
  - 1. Metal Finishes Manual for Architectural and Metal Products.
- L. American Architectural Manufacturers Association (AAMA):
  - 1. AAMA 607.1 - Clear Anodic Finishes for Architectural Aluminum.
  - 2. AAMA 611 Voluntary Specification for Anodized Architectural Aluminum.

**1.3 DEFINITIONS**

- A. Activation Device: Device that, when actuated, sends an electrical signal to the door operator to open the door.

**1.4 PERFORMANCE REQUIREMENTS**

- A. Provide automatic door operators capable of withstanding structural loads and thermal movements based on testing manufacturer's standard units in assemblies similar to those indicated for this Project.
- B. Operating Range: Minus 30 deg F (29 deg C) to 130 deg F (54 deg C).
- C. Opening-Force Requirements for Egress Doors: In the event power failure to the operator, swinging automatic entrance doors shall open with a manual force, not to exceed 30 lbf (133 N) applied at 1" (25 mm) from the latch edge of the door.
- D. Break Away Requirements: Automatic door operators shall breakaway with no more than 50 lbf (222 N) applied at 1" (25 mm) from the latch edge of the door.
- E. Door Energy: The kinetic energy of a door in motion shall not exceed 1.25 lbf-ft (1.69 Nm).
- F. Closing Time:
  - 1. Doors shall be field adjusted to close from 90 degrees to 10 degrees in 3 seconds or longer.
  - 2. Doors shall be field adjusted to close from 10 degrees to fully closed in not less than 1.5 seconds.

**1.5 SUBMITTALS**

- A. Submit listed submittals in accordance with Conditions of the Contract and Division 01 submittal procedures.
- B. Shop Drawings: Include plans, elevations, sections, details, hardware mounting heights, and attachments to other work. Indicate wiring for electrical supply.
- C. Color Samples for selection of factory-applied color finishes.
- D. Closeout Submittals: Provide the following with project close-out documents.
  - 1. Owner's Manual.
  - 2. Warranties.

**1.6 QUALITY ASSURANCE**

- A. Installer Qualifications: Manufacturer's authorized representative who is trained for installation and maintenance of units required for this Project.
- B. Manufacturer Qualifications: A qualified manufacturer with a manufacturing facility certified under ISO 9001 and with company certificate issued by AAADM.
- C. Certifications: Automatic door operators shall be certified by the manufacturer to meet performance design criteria in accordance with the following standards:
  - 1. ANSI A156.10.
  - 2. NFPA 101.
  - 3. UL 325 Listed (Fire Door Operator)
  - 4. ICBO (UBC Standard 10-1).
  - 5. California Department of Forestry and Fire Protection, Listed.
- D. Source Limitations: Obtain automatic door operators through one source from a single manufacturer.
- E. Product Options: Drawings indicate sizes, profiles, and dimensional requirements of automatic entrance door assemblies and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
- F. Power Operated Door Standard: ANSI/BHMA A156.19.
- G. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for intended use.

- H. Emergency-Exit Door Requirements: Comply with requirements of authorities having jurisdiction for swinging automatic entrance doors serving as a required means of egress.

### **1.7 PROJECT CONDITIONS**

- A. Field Measurements: General Contractor shall verify openings to receive automatic door operators by field measurements before fabrication and indicate measurements on Shop Drawings.
- B. Mounting Surfaces: General Contractor shall verify all surfaces to be plumb, straight and secure; substrates to be of proper dimension and material.
- C. Other trades: General Contractor Advise of any inadequate conditions or equipment.

### **1.8 COORDINATION**

- A. Templates: Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing automatic door operators to comply with indicated requirements.
- B. Electrical System Roughing-in: Coordinate layout and installation of automatic door operators with connections to, power supplies, and remote activation devices.
- C. System Integration: Integrate automatic door operators with other systems as required for a complete working installation.
  - 1. Provide electrical interface control capability for card reader or keypad operation of automatic door operators on doors with electric locking.
  - 2. Where required for proper operation, provide a time delay relay to signal automatic door operator to activate only after electric lock system is released.

### **1.9 WARRANTY**

- A. Automatic door operators shall be free of defects in material and workmanship for a period of one (1) year from the date of substantial completion.
- B. During the warranty period the Owner shall engage a factory-trained technician to perform service and affect repairs. A safety inspection shall be performed after each adjustment or repair and a completed inspection form shall be submitted to the Owner.
- C. During the warranty period all warranty work, including but not limited to emergency service, shall be performed during normal working hours.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Subject to compliance with requirements, provide products by one of the following Manufacturers:
  - 1. Stanley, Ontario Canada; Magic-Force™ Series automatic door operator (BOD)
  - 2. Dorma, Columbia, MD
  - 3. LCN Allegion, Dublin, Ireland

### **2.2 MATERIALS**

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
  - 1. Headers: 6063-T6.
  - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
  - 3. Sheet and Plate: ASTM B 209.
- B. Sealants and Joint Fillers: Refer to Division 07 Section "Joint Sealants".

### **2.3 COMPONENTS**

- A. Header Case: Header case shall not exceed 6" (152 mm) square in section and shall be fabricated from extruded aluminum with structurally integrated end caps, designed to conceal door operators and controls. The operator shall be sealed against dust, dirt, and corrosion within the header case. Access to the operator and electronic control box shall be provided by a full-length removable cover, edge rabbetted to the header to ensure a flush fit. Removable cover shall be secured to prevent unauthorized access.

- B. Door Arms: A combination of door arms and linkage shall provide positive control of door through entire swing; units shall permit use of butt hung, center pivot, and offset pivot-hung doors.
- C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, non-staining, non-bleeding fasteners and accessories compatible with adjacent materials.
- D. Signage: Provide signage in accordance with ANSI/BHMA A156.19.

## **2.4 SWINGING DOOR OPERATORS**

- A. Provide door 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 type of occupancy indicated.
- B. Electromechanical Operators: Self-contained unit powered by a minimum 3/16 horsepower, permanent-magnet DC motor; through a high torque reduction gear system.
  - 1. Operation: Power opening and spring closing.
  - 2. Operator Type: Low energy; readily convertible to full energy; no tools required to change type.
  - 3. Handing: Non-handed; no tools required to change handing.
  - 4. Capacity: Rated for door panels weighing up to 350 pounds.
  - 5. Mounting: Visible
  - 6. Features:
    - a. Adjustable opening and closing speeds.
    - b. Adjustable opening and closing force.
    - c. Adjustable back-check.
    - d. Adjustable hold-open time between 0 and 30 seconds.
    - e. Reverse on obstruction.
    - f. Variable rate open/closed speed control.
    - g. Closed loop speed control with active braking and acceleration.
    - h. Variable obstruction recycle time delay.
    - i. Optional Switch to open/Switch to close operation.
    - j. When operators are provided in pairs, adjustable features are independently adjustable for each operator.
- C. Field Adjustable Spring Closing Operation: The operator shall close the door by spring energy employing the motor, as a dynamic brake to provide closing speed control. The closing spring shall be a helical compression spring, adjustable for positive closing action. The spring shall be adjustable, without removing the operator from the header, to accommodate a wide range of field conditions.
- D. Independent Adjustable Closing and Latching Speed Control: The operator shall employ a rheostat module to allow for independent field adjustment of closing and latching speeds using the motor as a dynamic brake.
- E. Field Adjustable Open Stop: The operator shall provide a field adjustable open stop to accommodate opening angles from 80 to 135 degrees without the need for additional components.
- F. Consistent Cycle: The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open. Additionally, the range of the force shall be field adjustable to accommodate a wide range of on-site conditions.
- G. Quiet Performance: The operator shall be designed to output audible noise ratios less than or equal to 50dba.
- H. Manual Use: The operator shall function as a manual door closer in the direction of swing with or without electrical power. The operator shall deliver an even, consistent open force across the entire transition from door fully closed to door fully open.
- I. Electrical service to door operators shall be provided under Division 26 Electrical. Minimum service to be 120 VAC, 10 amps for doors with operators in pairs, 5 amps for single doors.

**2.5 ELECTRICAL CONTROLS**

- A. Electrical Control System: Electrical control system shall include a microprocessor controller and position encoder. The encoder shall monitor revolutions of the operator shaft and send signals to microprocessor controller to define door position. Systems utilizing external magnets and magnetic switches are not acceptable.
- B. Life Cycle Data Counter: The microprocessor control shall incorporate a non-re-settable counter to track door operation cycles.
- C. Controller Protection: The microprocessor controller shall incorporate the following features to ensure trouble free operation:
  - 1. Automatic Reset Upon Power Up.
  - 2. Main Fuse Protection.
  - 3. Electronic Surge Protection.
  - 4. Internal Power Supply Protection.
  - 5. Resettable sensor supply fuse protection.
  - 6. Software "Watchdog" protection in the case of software malfunction.
- D. Push Button Interface with LED: The controller shall have push button switches with LED readout to allow for selection or change of the following parameters: carpet or timer logic, single or dual door, activation options, normal back check or large back check, push-to-open assist on/off.
- E. Soft Start/Stop: A "soft-start" "soft-stop" motor driving circuit shall be provided for smooth normal opening and recycling.
- F. Safety Search Circuitry: Provide system to recycle the swinging panels when an obstruction is encountered during the closing cycle. If an obstruction is detected, the system shall search for that object on the next closing cycle by reducing door closing speed prior to the previously encountered obstruction location, and will continue to close in check speed until doors are fully closed, at which time the doors will reset to normal speed. If obstruction is encountered again, the door will come to a full stop. The doors shall remain stopped until obstruction is removed and operate signal is given, resetting the door to normal operation.
- G. Programmable Controller: Microprocessor controller shall be programmable and shall be designed for connection to a local configuration tool. Local configuration tool shall be software driven and shall be utilized via Palm® handheld interface. The following parameters may be adjusted via the configuration tool.
  - 1. Operating speeds and forces as required to meet ANSI/BHMA A156.10.
  - 2. Adjustable and variable features as specified in 2.04, B., 6.
  - 3. Firmware update.
  - 4. Trouble Shooting
    - a. I/O Status.
    - b. Electrical component monitoring including parameter summary.
  - 5. Entrance profile copy/paste.
  - 6. Software for local configuration tool shall be available as a free download from the automatic door operators manufacturer's internet site.
- H. Emergency Breakout Switch: A cam actuated emergency breakout switch shall be provided to disconnect power to the motor when an in-swinging door is manually pushed in the emergency out direction. The operator will then automatically reset and power will be resumed.
- I. Control Switch: Automatic door operators shall be equipped with a three position function switch to control the operation of the door. Control switch shall provide three modes of operation, Automatic, Off, and Hold-Open.
- J. Power Switch: Automatic door operators shall be equipped with a two position On/Off switch to control power to the door.

**2.6 ACTIVATION DEVICES**

- A. Activation for Low Energy Doors:
  - 1. Push Plates: Provide 4-1/2 inch (114 mm) square SPDT push plates with UL listed switch. Face plates and mounting studs shall be stainless steel. Face plates shall be engraved with the international symbol for accessibility and "Push To Open".
    - a. Interior and exterior push plates shall be wall mounted in single or double gang electrical boxes and hardwired to door operator controls.

**2.7 ALUMINUM FINISHES**

- A. Comply with NAAMM Metal Finishes Manual for Architectural and Metal Products for recommendations for applying and designing finishes. Finish designations prefixed by AA comply with system established by Aluminum Association for designing finishes.
- B. Class II, Clear Anodic Finish: AA-M10C22A31 Mechanical Finish: as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.40 mils minimum complying with AAMA 611-98, and the following:
  - 1. AAMA 607.1
  - 2. Applicator must be fully compliant with all applicable environmental regulations and permits, including wastewater and heavy metal discharge.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of swinging automatic entrance doors. Proceed with installation only after unsatisfactory conditions have been corrected.

**3.2 INSTALLATION**

- A. Do not install damaged components. Fit joints to produce hairline joints free of burrs and distortion. Rigidly secure non-movement joints.
- B. Mounting: Install automatic door operators/headers plumb and true in alignment with established lines and grades. Anchor securely in place.
  - 1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
  - 2. Set headers, arms and linkages level and true to location with anchorage for permanent support.
- C. Door Operators: Connect door operators to electrical power distribution system as specified in Division 26 Sections.
- D. Sealants: Comply with requirements specified in Division 07 Section "Joint Sealants" to provide weather tight installation.

**3.3 FIELD QUALITY CONTROL**

- A. Testing Services: Factory Trained Installer shall test and inspect each swinging automatic entrance door to determine compliance of installed systems with applicable ANSI standards.

**3.4 ADJUSTING**

- A. Adjust door operators, controls, and hardware for smooth and safe operation, for weather-tight closure, and complying with requirements in ANSI/BHMA A156.19 by AAADM Certified Technician.

**3.5 CLEANING AND PROTECTION**

- A. Clean surfaces promptly after installation. Remove excess sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.

**END OF SECTION**



**SECTION 087154  
SECURITY KEY KEEPER**

**PART 1 - GENERAL**

**1.1 SYSTEM REQUIREMENTS**

- A. Key Keeper: Key box mounted where required by the fire department for access to tenant space to respond to signal from fire alarm.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit manufacturer's descriptive literature and technical data on products proposed for use.
- C. Shop Drawings: Show plan for location and wiring diagram to alarm system.

**1.3 QUALITY ASSURANCE**

- A. Regulatory Requirements: Conform to fire department requirements.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.

**PART 2 - PRODUCTS**

**2.1 KEY KEEPER**

- A. Door: Heavy duty type with tamper-proof lock.
- B. Recessed model.
- C. Acceptable Product: KNOX-BOX, 3200 Series with optional alarm tamper switch.

**2.2 FINISHES**

- A. Exposed Metal: Black.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify recess is ready to receive work and field measurements are as shown on shop drawings.

**3.2 INSTALLATION**

- A. Install in accordance with Section 017300 and approved shop drawings.
- B. Secure lock box plumb, level, and secure in position.

**END OF SECTION**



**SECTION 088000****GLAZING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Glass for hollow metal, wood, and aluminum doors.
  - 2. Glass for interior borrowed light and sidelight frames.
  - 3. Glass for aluminum entrances and storefronts.
  - 4. Glass for display case.
  - 5. Associated glazing sealants and accessories.
- B. Related Sections:
  - 1. Section 083613 - Sectional Doors.
  - 2. Section 084113 - Aluminum Framed Entrances and Storefronts.
- C. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select adhesives and sealants meeting LEED requirements.

**1.2 SYSTEM REQUIREMENTS**

- A. General: In addition to requirements shown or specified, comply with design requirements of Section 014450.
- B. Design Requirements:
  - 1. Provide continuity of building enclosure to maintain continuous air and vapor barrier throughout glazed assembly from glass pane to heel bead of sealant.
  - 2. Employ registered professional engineer, licensed to practice structural engineering, to engineer each component of glass and glazing system.
- C. Glazing Requirements:
  - 1. Comply with CPSC 16 CFR 1201 and ANSI Z97.1 for safety requirements of glazing materials.
  - 2. Glass thickness, where indicated, are minimum requirements and are to be confirmed by glass manufacturer.
  - 3. Provide glass of thickness and heat treatment (annealed, heat strengthened or fully tempered) as necessary to prevent temperature stress breakage.
  - 4. Use 2.5 safety factor of glass to statistical probability of failure (8 lites/1000).
  - 5. Provide glass complying with ASTM E1300.
  - 6. Obtain safety glazing products permanently marked with certification label of the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
  - 7. Fire-rated glass ceramic clear and wireless glazing material listed for use in non-impact safety-rated locations such as transoms and borrowed lites with fire rating requirements ranging from 20 to 90 minutes with required hose stream test.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Manufacturer's product data for each type of glass and glazing material specified, including glazing accessories and glazing sealants.
- C. Shop Drawings:
  - 1. Sections and details of glass and glazing materials installation at framing members including head, mullions, transoms, jambs and sills.
  - 2. Stamp shop drawings with seal and signature of professional engineer responsible for design.
- D. Samples: 12 inches by 12 inches in size illustrating color of glass.

- E. Submit following Informational Submittals:
  - 1. Test Reports:
    - a. Glazing sealant indicating substrate adhesion.
    - b. Glazing sealant compatibility.
    - c. Glazing sealant manufacturer's recommendations.
  - 2. Certifications specified in Quality Assurance article.
  - 3. Qualification Data: Engineer's and installer's qualification data.
  - 4. Manufacturer's instructions.
- F. Closeout Submittals:
  - 1. Submit under provisions of Section 017700.
  - 2. Warranty: Submit specified warranty.
- G. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
    - a. Adhesives and sealants.

#### **1.4 QUALITY ASSURANCE**

- A. Single Source Responsibility: Glass of each type to be produced by same manufacturer.
- B. Engineer Qualifications: Registered professional engineer licensed to practice structural engineering, with minimum of 5 years experience in design of glass and glazing.
- C. Installer Qualifications: Acceptable to manufacturer with documented experience on at least 5 projects of similar nature in past 5 years.
- D. Regulatory Requirements:
  - 1. Fabricate glass to comply with ASTM C1036, ASTM C1048, and ANSI Z97.1.
  - 2. Perform work in accordance with GANA Glazing Manual for glazing installation methods.
  - 3. Fire-Resistive Glazing Products for Door Assemblies: Products identical to those tested per ASTM E 152, labeled and listed by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
- E. Certifications:
  - 1. Manufacturer's letter certifying glass and glazing materials compatibility.
  - 2. Manufacturer's letter certifying that sealed insulating glass units meet or exceed specification.
  - 3. Engineering certifications.

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

- A. Conduct pre-installation conference in accordance with Section 013100.

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

- A. Deliver, store, and handle products in accordance with Section 016000.

#### **1.7 PROJECT CONDITIONS**

- A. Environmental Requirements:
  - 1. Perform glazing when ambient temperature is above 40 degrees F.
  - 2. Perform glazing on dry surfaces only.

#### **1.8 WARRANTY**

- A. Manufacturer's standard 5 year warranty on hermetically sealed insulating glass units.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Basis of Design Color: Oldcastle.

- B. Other Acceptable Manufacturers:
  - 1. Cardinal IG, Minnetonka, MN.
  - 2. Ford Glass, Allen Park, MI.
  - 3. Guardian Industries Corporation, Carleton, MI.
  - 4. Viracon, Owatonna, MN.

## 2.2 GLASS MATERIALS

- A. Clear Glass:
  - 1. Quality: Glazing select, float, complying with ASTM C1036, Type I, Class 1, Quality q3.
  - 2. Type: Annealed.
  - 3. Thickness: 1/4 inch.
- B. Clear Tempered Glass: Same type as above except tempered, complying with ASTM C1048, Kind FT fully tempered.
- C. GL-1 Insulating Units, Vision, Tinted:
  - 1. Quality: Double glazed, hermetically sealed around perimeter with continuous metal spacer filled with moisture absorbing desiccant per ASTM E2190, adhered to glass lights with:
    - a. Primary Seal: Polyisobutylene.
    - b. Secondary Seal: Silicone two-part.
  - 2. Total thickness: 1 inch.
    - a. Outer Light:
      - 1) Quality: Glazing select, float, complying with ASTM C1036.
      - 2) Type: Heat-strengthened, complying with ASTM C1048, Kind HS, heat strengthened where required by heat load; tempered, complying with ASTM C1048, Kind FT fully tempered where required by code for safety glazing.
      - 3) Thickness: 1/4 inch.
      - 4) Low E Coating: No. 2, inner surface.
      - 5) Color: Tinted.
      - 6) Basis of Design: Eclipse Advantage Blue Green, Oldcastle.
    - b. Inner Light:
      - 1) Quality: Glazing select, float.
      - 2) Type: Annealed; Heat-strengthened, complying with ASTM C1048, Kind HS, heat strengthened where required by heat load; tempered, complying with ASTM C1048, Kind FT fully tempered where required by code for safety glazing.
      - 3) Thickness: 1/4 inch.
      - 4) Color: Clear.
    - c. Air Space: 1/2 inch dehydrated air space.
- D. Fire-Resistive Glazing:
  - 1. Fire-Resistive, Ceramic Glazing Material: Proprietary product of clear flat sheets of 3/16 inch nominal thickness, weighing 2.5 psf, permanently labeled by testing and inspecting agency, acceptable to authorities having jurisdiction, showing product complies with fire-resistive installation indicated, and as follows:
    - a. Polished on both surfaces, transparent with minimum visible light transmission of 80 percent.
    - b. Safety glazing complying with ANSI Z97.1 and CPSC 16 CFR 1201.
    - c. Fire-rated glazing material with 3M® Scotchshield® Ultra Film applied to the surface, human impact safety-rated, wireless, fire-rated glass ceramic glazing.
    - d. Product:
      - 1) FireLite NT Premium safety glazing by Technical Glass Products, Inc., Snoqualmie, WA.
      - 2) Pyran Platinum F, SaftiFirst.
      - 3) Pyran Platinum F, Schott Glass.

## 2.3 GLAZING ACCESSORIES

- A. Setting Blocks:
  - 1. Material: Preformed neoprene, compatible with sealant.
  - 2. Hardness: 80-90 Shore A durometer.

3. Size: 0.10 inch for each square foot of glazing, not less than 4 inch length by width of channel minus 1/16 inch by 1/4 inch high.
  4. Location: Sill quarter points, centered minimum 4 inches from each edge.
  5. Requirement: Resistant to sunlight, weathering oxidation and permanent deformation under load.
- B. Spacer Shims:
1. Material: Preformed neoprene, compatible with sealant.
  2. Hardness: 50-60 Shore A durometer.
  3. Size: Minimum 3 inch length by 1/2 height of glazing stop by thickness to suit application.
- C. Edge Blocks:
1. Material: Preformed neoprene, compatible with sealant.
  2. Hardness: 60-70 Shore A durometer.
  3. Size: Minimum 4 inch length by width to support thickness of glass, allow nominal 1/8 inch clearance between edge of glass and edge bumper.
  4. Location: Place in vertical channel.
  5. Requirement: Resistant to sunlight, weathering, oxidation and permanent deformation under load.
- D. Glazing Tapes:
1. Material: Preformed butyl or closed cell PVC foam with integral spacing device and containing paper release.
  2. Hardness: 10-15 Shore A durometer.
  3. Size: Continuous corner to corner.
  4. Acceptable Products:
    - a. CRL Norton Brand Glazing Tapes.
    - b. Pre-Shimmed 440 Tape, Tremco, Inc., Beachwood, OH.
    - c. Norseal V-980, Saint Gobain Performance Plastics, Granville, NY.
- E. Fire Rated Glazing Tapes: Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by fire rated glazing manufacturer.
- F. Sliding Glass Hardware:
1. Type: Aluminum trim members with accessories for interior sliding glazed windows.
  2. Components:
    - a. Upper Channel: Double channel for tops and sides.
    - b. Rollers: Nylon rollers, press fit into bottom of shoe, 2 per sheet of glazing.
    - c. Vinyl Guides: Vinyl cap fits over top of glazing.
    - d. Shoe: Shoe for 1/4 inch glazing materials, rollers to be inserted in bottom, 1 inch high.
    - e. Lower Track: Double track 1-1/16 inches wide by 1/4 inch high.
    - f. Bumpers: Rubber bumpers installed in jambs to act as stop and cushion glazing.
    - g. Lock: Plunger lock designed to mount in shoe.
    - h. Finger Pull: Two-piece threaded finger pull for 1/4 inch glazing, 1-1/16 inches OD, bright chrome
  3. Size: As indicated on Drawings.
  4. Acceptable Product:
    - a. Basis of Design: No. 1092 ANOD with Nos. 1087, 836, and 981, Knappe and Vogt, Grand Rapids, MI.
    - b. Equal Products by:
      - 1) CR Laurence.
      - 2) Hafele

## 2.4 GLASS FABRICATION

- A. Accurately size glass to fit openings allowing clearances following recommendations of "Glazing Manual" published by Glass Association of North America (GANA).
- B. Cut glass clean and carefully. Nicks and damaged edges will not be accepted. Replace glass with damaged edges.
- C. Heat Treatment:

1. Ensure heat-strengthened and tempered glass is examined by glass manufacturer to detect and discard lights which exceed GANA and industry standard tolerances for bow.
  2. Where strengthening process results in essentially parallel ripples or waves, maximum allowable deviation from flatness at any peak-to-valley is 0.003 inch.
  3. Where bow tolerance and wave tolerance differ, stricter requirement governs.
  4. Heat soak test tempered glass with sufficiently high temperature and duration to break glass containing nickel sulfide inclusions.
  5. As an alternative to heat soaking, other quality control measures may be used provided that glass with nickel sulfide inclusions is eliminated.
  6. Upon request by Architect or Owner, submit written quality control records attesting that procedures have been implemented to eliminate nickel sulfide inclusions or that heat soaking requirements have been accomplished.
  7. This Specification defines nickel sulfide inclusions as a glass material defect.
- D. Insulating Glass:
1. Fabricate insulated glass with double edge seals.
  2. Provide continuous (including corners) primary seal between glass and desiccant filled spacer fabricated from extruded polyisobutylene.
  3. Provide secondary seals completely covering spacer without voids or gaps and continuously bonded to both panes of glass.
  4. Verify thickness of secondary seal for silicone supported units for structural adequacy by testing.
  5. Ensure edge seal is capable of transferring at least 3 times force per linear inch produced by design pressure acting on outdoor glass alone or on indoor glass alone.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify that openings for glazing are correctly sized and within tolerances.
- C. Verify that glazing channel surfaces or recesses are clear, free of burrs, obstructions, irregularities, and glass is free of edge damage or imperfections.

#### **3.2 PREPARATION**

- A. Clean contact surfaces with solvent and wipe dry.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Verify that materials used for cleaning edges of sealed insulating units are compatible with sealants and components and will not damage or cause deterioration of the integrity of the sealed insulating unit.

#### **3.3 INSTALLATION**

- A. Install glass units in accordance with Section 017300.
  1. Ensure weep and drainage holes are not blocked by sealants or setting blocks.
  2. Install so that appropriate FireLite® markings remain permanently visible.
- B. Preformed Glazing Gaskets (Dry Method):
  1. Cut gasket to proper length.
  2. Weld joints by butting gasket and sealing junctions with sealant.
  3. Place setting blocks at quarter points, with edge blocks no more than 6 inches from corner.
  4. Rest glass on setting blocks and push against stop with sufficient pressure to ensure full contact and adhesion at perimeter.
  5. Install removable stops, avoiding displacement of gasket and exert pressure for full continuous contact.
  6. Install storefront glass in gaskets as specified in Section 084113.
- C. Interior Dry Method (Tape and Tape):
  1. Cut glazing tape to length and install against permanent stop, projecting 1/16 inch above sight line.

2. Place setting blocks at 1/4 points with edge blocks no more than 6 inches from corners.
  3. Rest glass on setting blocks and push against stop for full contact and adhesion at perimeter.
  4. Place glazing tape on free perimeter of glass in same manner described above.
  5. Install removable stop, avoid displacement of tape, exert pressure on tape for full continuous contact.
  6. Knife trim excess or protruding tape.
- D. Interior Wet/Dry Method (Tape and Sealant):
1. Cut glazing tape to length and set against permanent stops, projecting 1/16 inch above sight line.
  2. Place setting blocks at 1/4 points with edge blocks no more than 6 inches from corners.
  3. Rest glass on setting blocks and push against tape with sufficient pressure to ensure full contact and adhesion at perimeter.
  4. Install removable stops, insert spacer strips between glass and removable stops at 2 foot intervals, 1/4 inch below sight line.
  5. Fill gap between glass and removable stop with sealant to depth equal to bite of frame on glass to uniform and level line.
  6. Neatly trim off excess tape to sight line.
- E. Tempered Glass:
1. Do not cut, seam, nip or abrade tempered glass.
  2. Install in windows and sidelights where required by code.

### **3.4 PROTECTION**

- A. Protect finished Work under provisions of Section 017300.
- B. After installation, mark glass pane with an "X" by using removable plastic tape or paste.
- C. Do not mark heat absorbing or reflective glass units.

### **3.5 CLEANING**

- A. Clean work under provision of Section 017300.
- B. Remove excess glazing materials from finished surfaces.
- C. Remove labels after work is completed.
- D. Wash and polish both faces not more than 7 days prior to Owner's acceptance of work.
- E. Comply with glass manufacturer's recommendations for final cleaning.

**END OF SECTION**



**SECTION 088300****MIRRORS****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select adhesives and sealants meeting LEED requirements.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit product data for each item.
- C. Shop Drawings:
  - 1. Indicate fabrication and installation details not shown on manufacturer's literature.
  - 2. Indicate sizes, locations, number of sections, method of mounting, and when applicable, mounting heights.
- D. Submit Informational Submittal: Manufacturer's instructions.
- E. Closeout Submittals:
  - 1. Submit under provisions of Section 017700.
  - 2. Warranty: Submit specified warranty.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
    - a. Adhesives and sealants.

**1.3 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.

**1.4 WARRANTY**

- A. Provide warranty in accordance with Section 017700.
- B. Provide written warranty signed by mirror manufacturer agreeing to replace mirrors which develop black edge or silver deterioration within 5 years from date of Substantial Completion.

**PART 2 - PRODUCTS****2.1 MATERIALS**

- A. Mirror Glass:
  - 1. Quality: ASTM C1036, Type I transparent flat, Class 1 clear, Quality q2 mirror.
  - 2. Type: Annealed
  - 3. Provide mirrors, free from objectionable wave, with safety glass backing complying with CPSC 16 CFR Part 1201, Category II and ANSI Z97.1 glazing standards for mirrors in Physical Training area, locations extending to within 18 inches of floor, and similar hazardous locations.
  - 4. Thickness: 1/4 inch.
  - 5. Size: One piece units or abutting sections, sizes indicated on Drawings.
  - 6. Edges: Square and polished.
  - 7. Reflective Coating: Manufacturer's standard silver coating followed by electrolytic deposited copper coating and separate coat of protective paint.
- B. Mirror Adhesive: Type: Mix of asphaltic bitumens, fibers and mineral spirits formulated to protect mirror silvering.

- C. Primers/Sealers: Types recommended by adhesive manufacturer.
- D. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that comply with VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
  - 1. Current requirement refers to the date on which the materials are installed in the building.
  - 2. SCAQMD Rule #1168 referenced in Section 018113 is current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
  - 3. Interior refers to all building construction that is inside of the exterior weatherproofing material.
- E. Metal Moldings:
  - 1. Type: Extruded aluminum, 0.060 inch thickness, one piece for full length.
  - 2. Finish: 110 natural buffed brite.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.

#### **3.2 PREPARATION**

- A. Prime or seal back of mirrors and surfaces to receive mirrors as recommended by adhesive manufacturer.
- B. Ensure surfaces to receive mirrors mounted with clips are decorated and painted as scheduled prior to installation of mirrors.

#### **3.3 INSTALLATION**

- A. Adhesive Mounting:
  - 1. Apply adhesive to back of mirror in accordance with manufacturer's instructions allowing approximately 60 percent coverage when pressed into place.
  - 2. Press mirror firmly to bond with mounting surface. Allow ventilation space between mirror and substrate; do not seal edges.
  - 3. Set mirrors on metal molding at bottom edge.
- B. Metal Moldings: Secure to substrate grounds in accordance with manufacturer's instructions; miter intersections.

#### **3.4 CLEANING**

- A. Remove labels after Work is completed.
- B. Clean, wash and polish surfaces following manufacturer's recommendations.

**END OF SECTION**

**SECTION 089100****LOUVERS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Related Sections:
  - 1. Division 23 - Ductwork attachment to louvers.
- B. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select materials to maximize use of recycled aluminum.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 SYSTEM DESCRIPTION**

- A. General: In addition to requirements shown or specified, comply with AMCA Certified Ratings Program for design, materials, fabrication, and installation of component parts.
- B. Design Requirements:
  - 1. Manufacturer is responsible for designing units, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
  - 2. Employ registered professional engineer to engineer each component of metal wall louver system for louvers larger than 10 square feet of area.
  - 3. Drawings are diagrammatic and are intended to establish basic dimension of units, sight lines, and profiles of units.
  - 4. Modify only to meet field conditions and to ensure proper fitting of Work.
  - 5. Obtain Architect's approval of modifications.
  - 6. Provide concealed fastening wherever possible.
  - 7. Free area: Not less than 50 percent with screen.
  - 8. Wind loading: Designed, engineered and installed to withstand minimum positive and negative wind pressure as indicated in Section 014450.
  - 9. Attachment considerations shall take into account site peculiarities and expansion and contraction movements to prevent loosening, weakening or fracturing connection between units and substrate.
  - 10. Provide related accessories required to provide an air and watertight perimeter tie-in condition (including sill pan with end dams and upturned backleg).

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  - 1. Submit product data for metal wall louvers.
  - 2. Include information for factory finishes, sealants, accessories, and other required components.
  - 3. Include color charts for finish indicating manufacturer's standard colors available for selection.
  - 4. Include wiring diagrams and rough-in requirements.
- C. Shop Drawings:
  - 1. Submit shop drawings covering fabrication, installation, and finish of specified systems.
  - 2. Include following:
    - a. Fully dimensioned plans and elevations with detail coordination keys.
    - b. Locations of exposed fasteners and joints.
    - c. Include full size details of head, jamb and sill conditions including tie-in to air barrier.
- D. Samples:
  - 1. Submit samples indicating quality of finish on actual materials used for work, 12 inches long for extrusions and 6 inches square for sheet materials.

2. Where normal texture or color variations are expected, include additional samples illustrating range of variation.
- E. Submit following Informational Submittals:
  1. Design Data: Design data for metal wall louvers.
  2. Test Reports:
    - a. Written results of testing specified as part of System Requirements and Source and Field Quality Control articles.
  3. Certifications specified in Quality Assurance article.
  4. Qualification Data:
    - a. Manufacturer's and installer's qualifications verifying years of experience.
    - b. Include list of completed projects having similar scope of Work identified by name, location, date, reference names, and phone numbers.
  5. Manufacturer's Instructions:
    - a. Manufacturer's printed installation instructions.
    - b. Indicate by transmittal that copies of instructions and recommendations have been distributed to installer.
  6. Manufacturer's Field Reports: Written results and findings of manufacturer's field services specified as part of Field Quality Control.
- F. Closeout Submittals
  1. Project Record Documents:
    - a. Submit under provisions of Section 017700.
    - b. Record actual locations of metal wall louvers.
  2. Operation and Maintenance Data: Submit manufacturer's printed, recommended operation and maintenance data.
  3. Warranty: Submit specified product warranty in accordance with Section 017700.
- G. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Aluminum Louver Materials and Accessories.
  2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
    - a. Aluminum Louver Materials and Accessories.
  3. LEED Credit MRc5: Provide manufacturer name and location data for the following materials:
    - a. Aluminum Louver Materials and Accessories.

#### **1.4 QUALITY ASSURANCE**

- A. Single Source Responsibility: To ensure quality of appearance and performance, obtain materials for systems from either a single manufacturer or from manufacturer approved by systems manufacturer.
- B. Installer Qualifications: Certified in writing by system manufacturer as qualified for installation of specified systems.
- C. Regulatory Requirements: Ensure metal wall louver components comply with applicable portions of local, state, and federal codes, laws, and ordinances.
- D. Certifications:
  1. Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.
  2. Engineering certifications.

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

- A. Conduct pre-installation conference in accordance with Section 013100.
- B. Review requirements of Contract Documents and submittals.

- C. Review requirements for inspection and testing, forecasted weather conditions, governing regulations, insurance requirements, and proposed installation procedures and sequencing.
- D. Review anchor, tie, and flashing installation requirements.

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

- A. Comply with requirements of Section 016000.
- B. Protect finished surfaces as necessary to prevent damage.
- C. Do not use adhesive papers or sprayed coatings which become firmly bonded when exposed to sun.
- D. Do not leave coating residue on any surfaces.
- E. Replace damaged units.

#### **1.7 WARRANTY**

- A. Provide warranties in accordance with Section 017700.
- B. Provide written warranty jointly signed by manufacturer, installer and Contractor agreeing to repair and/or replace assemblies which fail in material or workmanship during warranty period of 2 [5] years from date of Substantial Completion.
- C. Provide written warranty stating organic coating finish will be free from fading more than 10 percent, chalking, yellowing, peeling, cracking, pitting, corroding or non-uniformity of color, or gloss deterioration beyond manufacturer's descriptive standards for 10 years from date of Substantial Completion.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers:
  - 1. The Airolite Company, Marietta, OH.
  - 2. American Warming and Ventilating, Holland, OH.
  - 3. Construction Specialties, Inc., Cranford, NJ.
  - 4. Industrial Louvers, Inc., Delano, MN.
  - 5. Ruskin Manufacturing, Grandview, MO.

#### **2.2 MATERIALS**

- A. Provide aluminum with 20% minimum post-consumer recycled content.
- B. Aluminum Sheet: ASTM B209, alloy and temper as recommended by manufacturer.
- C. Aluminum Extrusions: ASTM B221, 6063-T5 alloy; temper as recommended by manufacturer.
- D. Bird Screen: 1/2 inch square mesh, 0.063 inch aluminum wire, 80 percent free area.
- E. Anchors and Fasteners:
  - 1. Hot-dip galvanized, stainless steel, aluminum or other non-ferrous metal, compatible with materials to be fastened.
  - 2. Types, gages, and lengths to suit installation conditions.
- F. Bituminous Paint: Manufacturer's standard cold applied asphalt mastic.

#### **2.3 GENERAL FABRICATION REQUIREMENTS**

- A. Fabricate assemblies of extruded aluminum except where specifically noted otherwise.
- B. Field bolt connections between frame members where necessary by louver size. Dress exposed welds smooth and flush with adjacent surfaces.
- C. Fabricate frames to suit adjacent construction with tolerances allowing for application of sealants in joints between louvers and adjoining work.
- D. Provide separate sill extension pieces, full width of louver assembly to prevent water penetrating to interior. Fabricate of same metal as louvers, except aluminum sheet metal is acceptable at extruded louvers.

- E. Provide bird screens for each louver. Fabricate frame of screen in manufacturer's standard extruded or folded design of same metal as louver.

## **2.4 STATIONARY LOUVERS**

- A. Drainable Blade Assemblies:
  - 1. Material: Extruded aluminum.
  - 2. Thickness: Not less than 0.081 inch thickness for extruded aluminum.
  - 3. Frame Depth: 4 inches.
  - 4. Blades: 45 degree, single drainable type spaced at 4 inch centers.
  - 5. Provide structural supports, and blade braces designed and spaced to withstand wind loading.
  - 6. Acceptable Manufacturers and Products:
    - a. The Airolite Company, Marietta, OH: Model CB6774.
    - b. Construction Specialties, Inc., Cranford, NJ: Model A4097.
    - c. Industrial Louvers, Inc., Delano, MN: Model 457.

## **2.5 FINISH**

- A. General:
  - 1. Apply finishes in factory after products are assembled.
  - 2. Protect finishes on exposed surfaces with protective covering, prior to shipment.
  - 3. Remove scratches and blemishes from exposed surfaces which will be visible after completing finishing process.
  - 4. Trim, flashings, screens, and fasteners finished to match louvers.
- B. Fluoropolymer Coating:
  - 1. Comply with AAMA 2605.
  - 2. Resin: 70 percent polyvinylidene fluoride (PVDF).
  - 3. Substrate: Cleaned and pre-treated.
  - 4. Primer:
    - a. Coating: Manufacturer's standard resin based compatible coating.
    - b. Dry Film Thickness: Minimum 0.20 mil.
  - 5. Topcoat:
    - a. Coating: PVDF.
    - b. Dry Film Thickness:
      - 1) Coil: 0.80 mil.
      - 2) Extrusion: 1.0 mil
  - 6. Color: Custom per Architect.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify that prepared openings are ready to receive assemblies and openings are of required dimensions.

### **3.2 INSTALLATION**

- A. Install in accordance with Section 017300 and approved shop drawings.
- B. Align louver assembly to ensure moisture drains from flashings and blades to exterior.
- C. Secure with concealed fasteners wherever possible.
- D. Apply coat of bituminous paint or zinc chromate primer on concealed aluminum surfaces in contact with cementitious or dissimilar materials.
- E. Mount screens on inside face of louvers.

**3.3 CLEANING**

- A. Repair exposed to view surfaces which have been damaged to match original condition.
- B. Clean surfaces and components to remove foreign substances.

**END OF SECTION**





**SECTION 092900**  
**GYPSUM BOARD ASSEMBLIES**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Related Sections:
  - 1. Section 078400 – Firestopping.
- B. This project is a registered US Green Building Council “LEED” project.
  - 1. Verify if a local plant (within 500 miles of jobsite) can supply the product.
  - 2. Verify if any product has any recycled, synthetic, or renewable content.
  - 3. Provide documentation certifying the percentage of recycled content of metal and gypsum board materials based on material cost per weight.

**1.2 DEFINITIONS**

- A. Wall: A vertical building element used to enclose or separate spaces. Walls include fixed partitions.

**1.3 SYSTEM DESCRIPTION**

- A. Design Requirements: Contractor: Responsible for designing metal framing used to comply with performance requirements, including anchorage to structural system and necessary modifications to meet specified requirements and maintain visual design concepts.
- B. Performance Requirements:
  - 1. Suspended Gypsum Board Ceilings, Soffits, and Bulkheads: Design and install to provide deflection of not more than L/360 of distance between supports.
  - 2. Interior Metal Stud/Gypsum Board Assemblies: Design and install to withstand lateral loading (air pressure) of 5 PSF with deflection limit not more than L/240 of partition height.
  - 3. Elevator Shaftwall Enclosure: Design and install to withstand lateral loading (air pressure) of 10 PSF with deflection limit not more than L/240 of partition height.
  - 4. Interior Metal Stud/Gypsum Board Assemblies at Atriums, Lobbies, Service Corridors, Exits, and Elevator Lobbies: Design and install to withstand lateral loading (air pressure) of 10 PSF with deflection limit not more than L/360 of partition height.
  - 5. Interior Metal Stud/Gypsum Board Assemblies at Locations with Ceramic Tile or Other Hard Surface Finishes: Design and install to withstand lateral loading (air pressure) with deflection limit not more than L/360 of partition height.
  - 6. Where documents indicate a stud size, size shall be considered minimum. Increase gage to meet minimum performance requirements.
  - 7. Accommodate building structure deflections in connections to structure.
- C. Fire Resistance Ratings:
  - 1. Where assemblies with fire ratings are indicated, provide materials and installations which are identical to assemblies tested in accordance with ASTM E119 by testing laboratories acceptable to authorities having jurisdiction.
  - 2. Construct assemblies identical to those indicated by reference to GA 600 or to design designations listed by Factory Mutual, Underwriters Laboratories, Warnock Hersey, or listing of other agencies acceptable to authorities having jurisdiction.
  - 3. Provide partition head assemblies for fire-rated full height partitions that have been successfully tested to accommodate deck deflection.

**1.4 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  - 1. Submit product data for:
    - a. Framing members.
    - b. Architectural metal trim.

2. Include data to indicate framing member materials, product criteria, section properties, load charts, and limitations.
3. Include color charts for finish indicating architectural metal trim manufacturer's standard colors available for selection.
4. Include information for factory finishes, and fire resistance ratings.
- C. Samples: Submit 12 inch length samples of each type of architectural metal trim. Indicate required finish on architectural metal trim.
- D. Submit following Informational Submittals:
  1. Certifications specified in Quality Assurance article.
  2. Manufacturer's instructions. Include applicable temperature and humidity ranges, special procedures, and perimeter conditions requiring special attention.
- E. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Framing Materials (steel)
    - b. Gypsum Board
    - c. Moisture Resistant Gypsum Board
    - d. Glass-Fiber Faced Tile Backing Gypsum Board
    - e. Gypsum Liner Panels
    - f. Cementitious Backing Board
    - g. Metal Trim (steel)
    - h. Acoustical Insulation
  2. LEED Credit MRc4: Provide Recycled content data for each different product type, size and manufacturer used for the following materials:
    - a. Gypsum Board
    - b. Moisture Resistant Gypsum Board
    - c. Glass-Fiber Faced Tile Backing Gypsum Board
    - d. Gypsum Liner Panels
    - e. Cementitious Backing Board
    - f. Acoustical Insulation
    - g. Recycled content materials claims shall meet the following requirements:
      - 1) Defined in accordance with the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e).
      - 2) The recycled content of each material shall be provided for the percentage by weight of post-consumer and pre-consumer content, as defined in the document referenced above, used in each product type used.
  3. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
    - a. Laminating Adhesive
    - b. Sealant and Sealant Primers

### 1.5 QUALITY ASSURANCE

- A. Single Source Responsibility: Except where specified otherwise, obtain gypsum board products, trim, joint treatment, and accessories from single manufacturer or from manufacturers recommended by prime manufacturer of gypsum board products.
- B. Certifications:
  1. Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.
  2. Submit certification for each proposed fire rated assembly attesting compliance with indicated requirements.

**1.6 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Storage and Protection:
  - 1. Store in dry ventilated space off ground.
  - 2. Protect materials from surface contamination, soiling, corrosion, construction traffic, and damage.
  - 3. Support on level platform and fully protect from weather and direct sunlight exposure.
  - 4. Store and support gypsum board in flat stacks to prevent sagging.
  - 5. Protect materials to keep them dry. Remove wet gypsum board from Project site.
  - 6. Protect gypsum board panels to prevent damage to edges, ends, and surfaces.
  - 7. Do not bend or damage metal trim.

**1.7 PROJECT CONDITIONS**

- A. Environmental Requirements: Comply with more restrictive of ASTM C840, or manufacturer's written requirements under which products can be installed.
  - 1. Maintain minimum uniform 50 degrees F temperature in building for 48 hours before and continuously until applied joint treatment and bonding adhesives are thoroughly dry.
  - 2. Do not allow ambient temperature to exceed 95 degrees F.
  - 3. Provide ventilation to remove moisture in excess of that required for drying of joint treatment materials after its application. Avoid drafts during dry, hot weather to prevent too rapid drying.

**PART 2 - PRODUCTS****2.1 FRAMING MATERIALS**

- A. General:
  - 1. Maximize use of recycled steel content with minimum of 60 percent.
  - 2. Studs, runners, and furring channels complying with ASTM C645.
  - 3. Provide with galvanized coating complying with ASTM A653, G40 thickness; rolled channels used in ceilings may be finished with manufacturer's standard rust inhibitive paint. At following locations provide following coating thicknesses:
    - a. Showers and exterior soffits: G60.
  - 4. Fire Rated Partition Head Construction Joint Assembly:
    - a. "Fire Trak" by Fire Trak Corporation, Kimball MN.
    - b. "SLP-TRK" by Slip Track Systems and Marketed by The Donovan Company, Inc.
    - c. VertiTrack Series, The Steel Network, Inc. Raleigh, NC.
  - 5. Vertical Deflection Connection: Provide VertiClip® or VertiTrack™ deflection-accommodating anchorage devices, by The Steel Network Inc. Products shall conform to the following material properties and performance criteria:
    - a. Code Criteria: Meet required head of wall connection criteria as required by applicable referenced code [and as indicated in UL2079] for cyclic wall movement.
    - b. Material Composition: Meeting ASTM A653/A, SS grade 50, class 1, 50 ksi minimum yield strength, 65 ksi minimum tensile strength, G-60 hot dipped galvanized coating.
    - c. Material Thickness: 0.036 inch thick for VertiClip SLD series.
    - d. Clips shall be designed for positive attachment to structure and stud web using step-bushing technology to provide frictionless vertical movement.
    - e. Provide clips with attached bushing and screw of the series, size, and configuration as recommended by manufacturer.
    - f. Friction-fit deep-leg track assemblies and tracks relying on steel flexure to perform are unacceptable.
- B. Steel Stud Framing Systems:
  - 1. Non-load-bearing roll formed galvanized steel.
  - 2. Wall studs: Channel-shaped design with punched web, manufacturer's standard return flange lip.
  - 3. Wall Stud Runners: Channel type members, with 1-1/4 inch flanges, and same sheet metal thickness as wall studs.

4. Extended Leg Ceiling Runners: Channel type members, with 2 inch flanges, and same sheet metal thickness as wall studs.
5. Bracing Members: Same size as studs.
6. Wall Studs:
  - a. Type 25:
    - 1) Return flange lip minimum dimension: 3/16 inches.
    - 2) Flange width minimum dimension: 1-1/4 inches.
    - 3) Uncoated sheet steel thickness: 0.0179 inches.
  - b. Type 22:
    - 1) Return flange lip minimum dimension: 3/16 inches.
    - 2) Flange width minimum dimension: 1-1/4 inches.
    - 3) Uncoated sheet steel thickness: 0.0270 inches.
  - c. Type 20:
    - 1) Return flange lip minimum dimension: 3/16 inches.
    - 2) Flange width minimum dimension: 1-1/4 inches.
    - 3) Uncoated sheet steel thickness: 0.0329 inches.
  - d. Type 18:
    - 1) Return flange lip minimum dimension: 1/2 inches.
    - 2) Flange width minimum dimension: 1-5/8 inches.
    - 3) Uncoated sheet steel thickness: 0.0478 inches.
- C. Ceiling and Soffit Framing - Channel and Cross Furring System:
  1. Comply with ASTM C754.
  2. Main Runner Channels:
    - a. Cold-rolled or hot-rolled steel.
    - b. Size: 1-1/2 inch minimum.
    - c. Weight: 0.45 pounds per foot, minimum.
  3. Furring Anchorages: 16 gage thick galvanized wire ties, or wire-type clips.
- D. Ceiling and Soffit Framing - Proprietary Direct Hung Suspension System:
  1. At Contractor's option, provide factory fabricated, proprietary system in lieu of channel and cross furring framing system.
  2. Provide interlocking cold-rolled sheet steel grid complying with ASTM C635, "Heavy Duty" structural classification.
  3. Acceptable Products and Manufacturers:
    - a. 640 Drywall Furring System, Chicago Metallic, Chicago, IL.
    - b. DFR-Series, Worthington Steel, Malvern, PA.
    - c. Rigid X, USG Interiors, Inc., Chicago, IL.
- E. Ceiling and Soffit Attachment Devices:
  1. General:
    - a. Size devices for 5 times load imposed by completed system as determined in accordance with ASTM E488.
    - b. Powder-actuated fasteners in concrete: Size devices for 10 times load imposed by completed system as determined in accordance with ASTM E1190.
  2. Hanger Anchorage Devices: Screws, clips, bolts, inserts or other devices applicable to indicated method of structural anchorage for ceiling hangers and whose suitability for use intended has been proven by certified test data.
  3. Hangers: Comply with requirements of ASTM C754 for maximum ceiling area and loads to be supported.

## 2.2 GYPSUM BOARD PRODUCTS

- A. Acceptable Manufacturers:
  1. Certaineed
  2. G-P Gypsum Corporation
  3. National Gypsum Company.
  4. United States Gypsum Company.
- B. Gypsum Board:
  1. Maximize use of recycled or synthetic gypsum.

2. Use recycled newsprint including post-consumer waste for facing paper.
  3. Comply with ASTM C1396.
  4. Type X or manufacturer's proprietary fire rated core for fire rated and shaftwall assemblies and locations where indicated; regular type at other assemblies.
  5. Maximum available lengths to minimize end-to-end butt joints, square cut ends, tapered edge.
  6. Thickness: 5/8 inch, except where indicated otherwise.
- C. Impact Resistant Gypsum Board:
1. Comply with ASTM C1396.
  2. Provide laminate clad backing if necessary to increase impact resistance to 260 ft-lbs. minimum.
  3. Thickness: 5/8 inch, except where indicated otherwise.
  4. Acceptable Manufacturers:
    - a. Hi-Impact XP Gypsum Board, National Gypsum Company.
    - b. Mold-Tough VHI Gypsum Board, United States Gypsum Company.
    - c. DensArmor Plus Impact Resistant Interior Panel, G-P Gypsum Corporation.
- D. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.
1. Comply with ASTM C1396.
  2. Core: Mold and moisture resistant gypsum core, 5/8 inch, Type X.
  3. Surface paper: 100% recycled content moisture/mold/mildew resistant paper on front, back, and long edges.
  4. Maximum available lengths to minimize end-to-end butt joints, square cut ends, tapered edge.
  5. Locations: Toilet Rooms and Lockers where cementitious board is not being used.
  6. Mold/Mildew Resistance: 10 when tested in accordance with ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
  7. Product and Manufacturer:
    - a. XP Wallboard, National Gypsum Company.
    - b. Proroc® Moisture And Mold Resistant With M2tech, Certaineed
    - c. Sheetrock Brand Mold Tough, USG.
- E. Glass Fiber Faced Gypsum Sheathing: Refer to Section 061643.
- F. Exterior Gypsum Soffit Board:
1. Comply with ASTM C1396.
  2. Type X or manufacturer's proprietary fire rated core for fire rated assemblies and locations where indicated; regular type at other assemblies.
  3. Maximum available lengths to minimize end-to-end butt joints, square cut ends, tapered edge.
  4. 5/8 inch thickness, except where indicated otherwise.

### 2.3 CEMENTITIOUS BACKING BOARD

- A. Description:
1. Cementitious composition with glass fiber reinforcement.
  2. Product specifically manufactured as substrate material for application of ceramic tile in wet areas.
  3. Comply with ANSI A118.9.
  4. 5/8 inch thickness, except where indicated otherwise.
  5. Use as option to glass-fiber faced tile backing gypsum board
  6. Acceptable Products and Manufacturers:
    - a. Durock Cement Board, United States Gypsum Company, Chicago, IL.
    - b. PermaBase Cement Board, National Gypsum Company, Charlotte, NC.
    - c. DomCrete Cementitious Tile Backer Board, Domtar Gypsum, Ann Arbor, MI.
    - d. Glas-Crete (Wonder-Board), Custom Building Products, Seal Beach, CA.

**2.4 METAL TRIM**

- A. General:
  - 1. Comply with ASTM C1047.
  - 2. Material: Zinc alloy or galvanized steel; zinc alloy required for application in shower areas, exterior soffits, and locker rooms.
  - 3. Uncoated sheet metal thickness: 26 gage minimum.
  - 4. Flanges designed for concealment in joint compound, flange width to suit installation requirements.
- B. Corner Beads at Straight Surfaces:
  - 1. Drywall Corner Bead, Alabama Metal Industries Corporation (AMICO), Birmingham, AL.
  - 2. Cornerbead, Clinch-On Products, Mounds View, MN.
  - 3. Wallboard Corner Bead, National Gypsum Company, Charlotte, NC.
  - 4. Beadex B1XW Paper Faced Metal Outside Corner, United States Gypsum Company, Chicago, IL.
- C. Edge Trim Beads:
  - 1. Drywall L-Metal, Alabama Metal Industries Corporation (AMICO), Birmingham, AL.
  - 2. L-Bead and U-Bead, Clinch-On Products, Mounds View, MN.
  - 3. Number 100 and 200 Wallboard Casing, National Gypsum Company, Charlotte, NC.
  - 4. B4 (L) and B9 (J) Paper Faced Metal Trim, United States Gypsum Company, Chicago, IL.
- D. Control Joints:
  - 1. V-Shaped slot.
  - 2. Acceptable Products and Manufacturers:
    - a. N-093, Alabama Metal Industries Corporation (AMICO), Birmingham, AL.
    - b. E-Z Strip Expansion Joint, National Gypsum Company, Charlotte, NC.
    - c. 093, Cemco or Clark Dietrich.

**2.5 ARCHITECTURAL METAL TRIM:**

- A. Acceptable Manufacturers:
  - 1. Conspec Systems, Inc./Cranford, Cranford, NJ.
  - 2. Fry Reglet Corporation, Alhambra, CA.
  - 3. Gordon, Inc., Shreveport, LA.
  - 4. Pittcon Industries, Riverside, MD.
- B. General:
  - 1. Sheets: ASTM B209.
  - 2. Extrusions: ASTM B221.
  - 3. Alloy, temper, and thickness required by manufacturer for strength, corrosion, resistance, finish application, and color.
  - 4. Minimum Thickness: 0.050 inch for extrusions, 0.012 inch for sheets.
  - 5. Provide glass fiber reinforced body putty or manufacturer's standard joint treatment for filling butt joints between units.
- C. Fabrication:
  - 1. Fabricate with continuous tapered fins for surface contact and finishing with gypsum board.
  - 2. Provide tapered fins with holes for screw fastening.
  - 3. Miter joints at intersections of units.
  - 4. Provide caps at terminated ends.
  - 5. Prefabricate corners and terminations.
  - 6. Cope joints at T-shaped and cross intersections of bullnose shapes.
  - 7. Provide compound corner joining units at three-way intersections of radiused corner units.
  - 8. Provide butt joints with reinforcing back-up joining plates and beveled or swaged edges.
  - 9. Provide accessory fastener clips and angles.
  - 10. Factory applied finish coating consisting of chemical conversion coating followed by baked-on finish coat compatible with gypsum joint compound, and alkyd and latex paints. Provide in manufacturers standard white color.
- D. Reveal Moldings:
  - 1. Model WR/0.5W-0.5D Contours by Conspec Systems, Inc./Cranford, Cranford, NJ.

2. Model DRM 50-50 Fry Reglet Corporation, Alhambra, CA.
3. Model 512-1/2 Final Forms by Gordon, Inc., Shreveport, LA.
4. Model SWR 050-050 Softforms by Pittcon Industries, Riverdale, MD.

## 2.6 JOINT TREATMENT AND ADHESIVE MATERIALS

- A. Joint Compound:
  1. Comply with ASTM C475.
  2. Board manufacturer's standard ready-mixed joint compounds low-VOC joint compounds with no detectable amounts of crystalline silica.
  3. Compounds specifically manufactured for topping coats are not permitted for first coat on metal trim and taping.
  4. Use board manufacturer's joint compound unaffected by humidity at exterior soffits.
  5. Mixing:
    - a. Mix compounds in strict accordance with manufacturer's directions.
    - b. Mix only enough at one time to be used during recommended pot life of compound.
  6. Use manufacturer's recommended compound for impact resistant gypsum board.
- B. Joint Reinforcement Tape for Gypsum Board: Paper reinforcing tape complying with ASTM C475.
- C. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that comply with VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
  1. Current requirement refers to the date on which the materials are installed in the building.
  2. SCAQMD Rule #1168 referenced in Section 018113 is current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
  3. Interior refers to all building construction that is inside of the exterior weatherproofing material.

## 2.7 ACCESSORIES

- A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.
- B. Backer Plates:
  1. Type: 16 gage or 0.053 inch uncoated metal thickness steel sheet, galvanized in accordance with ASTM A653, G60.
  2. Length: Sufficient to extend to nearest studs beyond maximum dimension of attached item and engage fasteners from attached item; span minimum 3 studs.
  3. Height: 6 inch minimum or higher where required to accommodate item being fastened.
  4. When manufacturer of attached item has more rigorous mounting plate requirements, comply with manufacturer's requirements.
- C. Fasteners:
  1. Fasteners for Metal Framing:
    - a. Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved.
    - b. Comply with the gypsum board manufacturer requirements for indicated applications.
  2. Gypsum Board Fasteners:
    - a. Self-drilling, self-tapping, bugle head screws conforming to ASTM C1002, length to suit application.
    - b. Type S screws for 0.0329 to 0.0179 inches; 21 to 26 gage thick metal framing and furring.
    - c. Type S-12 screws for 0.1046 to 0.0359 inches; 12 to 20 gage thick metal framing and furring.
    - d. Type G screws for gypsum board to gypsum board.
    - e. Polymer coated screws required for securing exterior gypsum soffit board to framing.
- D. Acoustical Insulation:
  1. Maximize use of recycled material with minimum of 20 percent recycled glass cullet.

2. Use formaldehyde free materials where available.
3. Comply with ASTM C665, Type I.
4. Mineral or glass fiber, friction fit, without integral vapor barrier membrane.
5. Flame spread 25 or less when tested in accordance with ASTM E84.
6. Thickness to match wall stud depth unless noted otherwise.
7. Fire-rated assemblies: Use products tested for fire rated assemblies.
8. Non-fire-rated assemblies: Use 2.5 to 3 pound density glass or mineral fiber products.
9. Acceptable Mineral Fiber Products:
  - a. Acoustical Fire Batts, AFB, Roxul.
  - b. Thermafiber Sound Attenuation Fire Blankets, Owens Corning Thermafiber.
10. Acceptable Glass Fiber Products:
  - a. Sound Attenuation Batts, Owens Corning, Toledo, OH.
  - b. Sound Control Batts, CertainTeed Corporation, Valley Forge, PA.
  - c. Sound Control Batts, Johns Manville, Denver, CO.
- E. Acoustical Sealant - Concealed Locations:
  1. Description:
    - a. Non-hardening, non-drying, non-skinning, non-staining, non-bleeding, non-sag synthetic rubber.
    - b. Capable of maintaining air-tight seal.
    - c. For use in concealed locations not exposed to view.
    - d. Specifically manufactured as acoustical sealant.
  2. Acceptable Products:
    - a. Acoustical Sealant; Tremco, Inc., Beachwood, OH.
    - b. BA-98 Acoustical Sealant; Pecora Corporation, Harleysville, PA.
    - c. Acrylic Latex, Tremco, Inc., Beachwood, OH.
    - d. USG Firecode Sound - Smoke Sealant, United States Gypsum Company, Chicago, IL
- F. Acoustical Sealant - Exposed Locations:
  1. Description:
    - a. ASTM C834.
    - b. Non-sag, non-staining, non-bleeding, and paintable.
    - c. Joint movement range without cohesive/adhesive failure: Plus 7.5 percent to minus 7.5 percent of joint width.
    - d. Color: As selected by Architect from manufacturer's standard colors [Custom color].
  2. Acceptable Products:
    - a. Chem-Calk 600; Bostik, Middleton, MA.
    - b. AC-20, Pecora Corporation, Harleysville, PA.
    - c. Sonolac, Sonneborn Division of BASF, Shakopee, MN.
    - d. Acrylic Latex, Tremco, Inc., Beachwood, OH.
    - e. USG Acoustical Sealant, United States Gypsum Company, Chicago, IL.
- G. Adhesives and sealants shall comply with VOC and chemical component limits of SCAQMD Rule 1168.
- H. Touch-Up Primer for Galvanized Surfaces: SSPC Paint 20.
- I. Cementitious Backer Units Accessories:
  1. Fasteners: Corrosion resistant type required by board manufacturer for securing units.
  2. Joint Reinforcement Tape:
    - a. 2 inch nominal width.
    - b. Polymer coated fiberglass mesh of type recommended by board manufacturer.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Verify rough-in utilities and blocking are in proper position.



**3.2 PREPARATION**

- A. Items Which Require Backer Plates or Blocking:
1. Coordinate sizes and locations.
  2. Install additional studs for attachment of backer plates and blocking in required locations to receive surface mounted accessories as indicated or as required by accessory manufacturer.
  3. Elimination of backer plates and blocking is not permitted.
  4. Direct attachment of items to studs is not permitted.

**3.3 FRAMING INSTALLATION**

- A. General:
1. Install in accordance with manufacturer's printed instructions, except for more stringent requirements of these specifications.
  2. Install units plumb, level, square, and free from warp and twist while maintaining dimensional tolerances and alignment with surrounding construction.
  3. Installation Tolerances:
    - a. Ceilings: 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.
    - b. Partitions:
      - 1) Maximum variation from true position: 1/8 inch.
      - 2) Maximum variation of any member from plane: 1/8 inch in 10'-0", non-cumulative.
  4. Control and Expansion Joints:
    - a. Do not bridge building control and expansion joints with metal framing systems.
    - b. Install independent framing on each side of joints.
    - c. Comply with manufacturer requirements for constructing control and expansion joints in fire-rated and shaftwall assemblies.
- B. Framing:
1. Install in accordance with ASTM C754 and with requirements of ASTM C840 that apply to framing installation, except for more stringent requirements of manufacturer or these Specifications.
  2. Suspended Ceilings and Soffits:
    - a. Install channel and cross-furring in accordance with ASTM C754.
    - b. Install proprietary drywall suspension systems in accordance with ASTM C636.
    - c. Coordinate location of hangers and framing with other construction above ceiling line.
    - d. Install ceiling framing independent of walls, columns, and above ceiling non-structural construction, unless otherwise required by fire-rated assembly requirements.
    - e. Install free from contact with insulation and other objects within ceiling plenum that are not part of supporting structural or ceiling suspension system.
    - f. Offset hangers only where required to miss obstructions; resist resulting horizontal forces by bracing, or other means.
    - g. Where width of ducts and other construction within ceiling plenum produces interference with location of hangers required to support standard suspension system members:
      - 1) Install supplemental suspension members and hangers in form of trapezes or equivalent devices.
      - 2) Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
    - h. Do not connect or suspend steel framing from pipes, ducts, and conduit.
    - i. For proprietary grids, provide attachments and hangers from structural support above, spaced on a grid of 24 by 48 inches.
    - j. Do not attach hangers to steel deck tabs or directly to metal roof deck. Provide supplementary framing to span between structural framing members when structural framing members are spaced more than 48 inches apart.
    - k. Reinforce openings in framing which interrupt main runners, furring channels, and bracing. Extend reinforcing minimum of 24 inches past each end of each opening.

- l. Proprietary direct hung framing: Tie direct to suspension; interconnect components in accordance with framing system manufacturer's instructions.
  - m. Space main runners at maximum 48 inches on center, unless otherwise indicated.
  - n. Provide additional framing to fulfill structural requirements and for support at recessed fixtures and similar items.
  - o. Laterally brace entire suspension system.
  - p. Provide cross and vertical bracing with additional framing to fulfill structural and wind uplift requirements for exterior soffits.
3. Studs and Runners:
- a. Stud Spacing: Provide as indicated.
  - b. Runner Tracks: Provide continuous tracks sized to match studs.
  - c. Where walls are indicated to extend to overhead surfaces (ceilings, deck construction, and structural elements), to prevent deflection transfer of structural loads or movements to walls provide either:
    - 1) Insert studs into runner tracks with minimum 1/2 inch gap between end of stud and inside surface of top and bottom runner. Maintain minimum of 1/2 inch engagement between end of stud and end of legs of top and bottom runners.
    - 2) Slip joint between walls and structure using top runner nested within 3 inch long segment of extended leg ceiling runner positioned at stud spacing and fastened to overhead surface. Do not fasten top runner to extended leg ceiling runner.
  - d. Terminate top of walls at ceiling construction, unless otherwise indicated.
  - e. Where walls are indicated to have framing extend only to ceiling attach ceiling runner securely to acoustical ceiling grid.
  - f. Brace stud framing rigid which is not clad on both sides with gypsum board. Fasten horizontal stud or 1-1/2 inch wide 20 gage galvanized steel straps vertically spaced no more than 36 inches apart with top strap no more than 6 inches from top of wall.
  - g. Horizontally align openings in stud webs.
  - h. Use full length studs vertically positioned between runner tracks.
  - i. Minimum Jamb Stud Framing at Door Openings:
    - 1) Walls laterally braced by ceiling framing or structure at 9'-0" above finish floor:
      - a) Single Doors not Larger than 3'-6" by 9'-0" and not Weighing more than 275 Pounds: 2 Type 25 studs or 1 Type 20 stud.
      - b) Paired Doors not Larger than 3'-6" by 9'-0" per leaf and not Weighing more than 275 Pounds per Leaf: 2 Type 20 studs or 1 Type 18 stud.
    - 2) Walls Laterally Braced by Ceiling Framing or Structure at 12'-0" above Finish Floor:
      - a) Single Doors not Larger than 3'-6" by 9'-0" and not Weighing More than 275 Pounds: 2 Type 20 studs or 1 Type 18 stud.
      - b) Paired doors not larger than 3'-6" by 9'-0" per leaf and not weighing more than 275 Pounds per leaf: 2 Type 18 studs.
    - 3) At welded frames with fixed anchor clips, secure studs to jamb anchors clips with not less than two self tapping screws per clip.
    - 4) Provide wall framing above door openings to match wall framing adjoining the opening.
    - 5) Provide one additional stud not more than 6 inches from jamb studs.
    - 6) At fire-rated doors use minimum thickness of Type 20 studs, unless otherwise indicated.
    - 7) Comply with GA-219 for fire-rated doors.
  - j. Minimum Sidelight Framing:
    - 1) Provide 2 Type 25 studs at each jamb or provide 1 Type 20 stud at each jamb.
    - 2) Provide wall framing above and below window and wall openings with wall framing to match wall framing adjoining the opening.
    - 3) Provide 1 additional stud not more than 6 inches from jamb studs.
  - k. Fabricate corners with a minimum of three studs.
  - l. Provide additional studs and framing to support wall intersections, termination of walls, at openings and cut-outs and to support built-in anchorage and attachment devices for other work.

- m. Locate studs no more than 2 inches from abutting walls, wall corners and other construction. Start typical wall studs 6 inches either side of stud reinforcing or frames.
- n. Install steel studs so that flanges point in the same direction and so that leading edges or ends of each gypsum board can be attached to open (unsupported) edges of stud flanges first.
- 4. Backer Plates:
  - a. Provide backer plate for securing surface mounted fittings, fixtures, accessories, and furnishings, including, but not limited to handrails, grab bars, toilet walls, towel bars, wall mounted door stops, and similar screw- and bolt-fastened items.
  - b. Secure with sufficient quantity of self-tapping sheet metal screws to sustain loads imposed by items attached to backer plates.
- 5. Blocking: Coordinate with Section 061053 for installation of concealed wood blocking and furring required for securing wood trim, carpentry, woodwork, cabinets, millwork, casework, surface mounted equipment, and similar nail-fastened items.

### 3.4 GYPSUM BOARD INSTALLATION

#### A. General:

- 1. Comply with more stringent requirements of GA 216, ASTM C840, manufacturer, and these Specifications.
- 2. Install gypsum board in accordance with GA 600 for fire-rated assemblies.
- 3. Install impact resistant gypsum board to a height of 8'-0" at all floors.
- 4. Install gypsum board panels with face side out.
- 5. Use boards of maximum length to minimize end joints.
- 6. Abut boards without forcing; neatly fit ends and edges of board and do not place butt ends against tapered edges with gap between adjacent panels no greater than 1/16 inch. Hold bottom of board 1/4 inch above floor.
- 7. Support ends or edges of board directly on framing or furring members.
- 8. Joint Staggering:
  - a. Ceilings: Stagger end joints not less than one framing member.
  - b. Walls: Stagger vertical joints on opposite side of walls to occur on alternate framing members.
  - c. Fire-Rated Assemblies: Comply with fire-rated assembly design requirements for joint staggering.
- 9. Do not locate gypsum board joints within 12 inches of external corners of windows, doors, or other such openings, except when control joints are installed at corners.
- 10. Cut openings in board with no greater than 1/4 inch gap around electrical outlets, plumbing, light fixtures, piping and other similar penetration items and small enough to be covered by plates and escutcheons; coordinate size of gap around penetrations in fire-rated assemblies with firestopping requirements of Section 078400.
- 11. Do not install imperfect, damp and damaged boards.
- 12. In concealed spaces above ceilings where designated walls extend full height to structure above, install boards in full coverage on both faces of framing system for fire, sound, air, and smoke-rated walls.
- 13. Fit gypsum panels around ducts, pipes, and conduits.
- 14. Where walls intersect open concrete coffer, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffer, joists, and other structural members; allow 1/4 to 1/2-inch wide joints to install sealant.
- 15. In concealed spaces above ceiling where designated chase walls extend full height to structure above, install boards in full coverage on one face of framing system. Fasten horizontal stud or 1-1/2 inch wide 20 gage galvanized steel straps vertically spaced no more than 36 inches apart with top strap no more than 6 inches from top of wall.
- 16. Attach gypsum panels to steel studs so that leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- 17. Attach gypsum panels to framing provided at openings and cutouts.

18. Isolate perimeter of non-load-bearing gypsum board walls at structural abutments, except floors, as detailed. Provide 1/4 to 1/2-inch wide spaces and trim edges with LC-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant for exposed locations.
  19. Control and Expansion Joints: Gypsum Association Publication GA 234. Use for fire-resistance rated and for non-fire-rated conditions.
    - a. Spacing: In accordance with GA 234.
    - b. Do not bridge building control and expansion joints with gypsum board. Utilize details shown in referenced standard.
    - c. Terminate gypsum board on each side of joints.
    - d. Comply with manufacturer requirements for constructing control and expansion joints in fire-rated and shaftwall assemblies.
      - 1) Locate studs on both sides of joints. Attach two layers of gypsum board strips to back of one stud to fill area behind joint; provide continuous fire barrier behind joint without restricting movement.
- B. Fasteners:
1. Attachment Methods:
    - a. Attach board to framing and furring with screws.
    - b. Attach board to board with screws.
  2. Except where indicated otherwise or where required for fire rated assemblies, space fasteners in compliance with more restrictive requirements of referenced installation standards or manufacturer's requirements.
  3. Attach board to supplementary framing and blocking which provide additional support at openings and cutouts.
- C. Ceilings:
1. Place with long edge perpendicular to orientation of furring or framing members.
- D. Single Layer Wall Installation: Install vertically in manner which will minimize end-butt joints, unless specific orientation is required by fire-rating design.
- E. Double Layer Wall Installation:
1. Install gypsum board for base layer, place long edge parallel to framing or furring members, unless specific directional requirement is established by fire-rating design.
  2. Install gypsum board for face layer, place parallel to base layer with offset joints, unless specific direction is required by fire-rating design.
  3. Secure base layer with fasteners.
  4. Secure face layer with fasteners or adhesive supplemented with fasteners, except where fire rated assemblies require only fasteners.
- F. Exterior Soffits:
1. Apply soffit board with long dimension perpendicular to framing.
  2. Position end joints over supports.
  3. Stagger end joints between adjoining panels.
  4. Allow at 1/4 inch between edge of soffit board and adjacent construction.
  5. Fasten with corrosion-resistant fasteners.
- G. Acoustical Insulation:
1. Install acoustical insulation in walls where indicated.
  2. Place insulation for full distance of space between studs for full coverage of sound-rated assembly.
  3. Fit insulation tight within spaces, around cut openings, behind and around electrical and mechanical items within or behind walls and tight to items passing through walls.
- H. Acoustical Sealant:
1. Seal with continuous bead at gypsum board edges on both faces of walls which receive acoustical insulation.
  2. Seal perimeter of face layer in single layer assemblies using acoustical sealant for exposed locations.
  3. Seal openings and cutouts; fill open spaces between board and fixtures, cabinets, ducts and other flush or penetrating items using acoustical sealant for exposed locations.

4. Seal behind control and expansion joints using acoustical sealant for concealed or exposed locations.
  5. Electrical Boxes:
    - a. Seal sides and backs of to completely close off openings and joints.
    - b. Seal joint between boxes and board.
  6. Setting track in sealant bead, in lieu of applying sealant to gypsum board panels, is not permitted.
- I. Intersections with Non-Sound-Rated Assemblies:
1. Extend sound-rated construction to completely close sound flanking paths through non-sound-rated construction.
  2. Install acoustical sealant for exposed locations at joints between face layers at vertical interior angles of intersecting assemblies.

### **3.5 TRIM INSTALLATION**

- A. Install trim flush using longest practical length; miter corners and intersections.
- B. Secure flanges by taping compound, screws, stapling, or clinching in accordance with manufacturer's instructions.
- C. Install corner beads at visually-exposed external corners, unless otherwise indicated.
- D. Install edge trim where edge of board would be exposed or semi-exposed and where board abuts dissimilar materials.
- E. Control Joints: Coordinate placement and locations with Architect prior to commencement of work. Install control joints in accordance with following:
  1. Locate at joints of maximum stress, at points of natural weak planes, such as at openings and at corners of offsets in walls exceeding 30'-0" in length.
  2. Extend control joints from both corners of door frames to top of wall where doors occur in long runs of wall.
  3. Where gypsum board is vertically continuous, as at stairwells and other long vertical wall areas.
  4. Locate in ceilings with area exceeding 900 square feet, where framing or furring changes direction, and spaced apart not more than 30'-0".
  5. Locate in ceilings where wings of "L", "U", and "T" shaped areas are joined.
  6. Provide mineral fiber acoustical insulation or gypsum panel backing at control joints in fire-rated assemblies to maintain fire rating.

### **3.6 ARCHITECTURAL METAL TRIM**

- A. Comply with manufacturer's installation and finishing instructions.
- B. Miter joints at intersections of units.
- C. Align adjoining units at butt joints.
- D. Fasten trim to wall framing using screw fasteners through tapered fins.
- E. At butt joints with reinforcing back-up joining plates, connect adjoining units using countersunk screw or pop rivet fasteners.
- F. Fill and sand as instructed by manufacturer at beveled and swaged edges.
- G. Install units with accessory fastener clips and angles when required for complete installation.

### **3.7 GYPSUM BOARD TREATMENTS**

- A. General:
  1. Apply joint treatment to gypsum board joints (both directions); flanges of corner beads, edge trim, and control joints; penetrations; fasteners; surface defects; and elsewhere to prepare surfaces for decoration and specified levels of gypsum board finish.
  2. Comply with manufacturer requirements for hardening and drying of joint treatment prior to application of succeeding coats.
- B. Prefill: Fill open joints, rounded and beveled edges, and damaged areas, flush with adjoining surfaces using prefill compound.

- C. Apply joint tape over gypsum board joints.
- D. Levels of Finish:
  - 1. Comply with GA-214; italicized commentary is excluded; replace words "may" and "should" with "shall."
  - 2. Locations to Receive Level 4 Finish: Areas to be painted
  - 3. Locations to Receive Level 3 Finish: Areas to receive Moisture resistant gypsum board used as a tile substrate.
  - 4. Locations to Receive Level 2 finish:
    - a. Fire-rated and smoke-rated assemblies in ceiling plenums and concealed areas.
  - 5. Locations to Receive Level 1 Finish:
    - a. Non-fire-rated and non-smoke-rated assemblies in ceiling plenums and concealed areas.

### **3.8 CEMENTITIOUS BACKING BOARD INSTALLATION**

- A. Vapor Retarder:
  - 1. Extend vapor retarder to extremities of areas indicated to be protected from vapor transmission.
  - 2. Secure in place with mechanical fasteners or adhesives.
  - 3. Extend vapor retarder to cover miscellaneous voids in insulated substrates, including those filled with loose mineral-fiber insulation.
  - 4. Seal vertical joints in vapor retarders over framing by lapping not less than two wall studs.
  - 5. Fasten vapor retarders to framing at top, end, and bottom edges, at perimeter of wall openings, and at lap joints; space fasteners no greater than 16 inches apart.
  - 6. Seal joints in vapor retarders caused by pipes, conduits, electrical boxes and similar items penetrating vapor retarders with vapor retarder tape.
  - 7. Repair tears and punctures in vapor retarder immediately before concealing it with the installation of cementitious backer units.
- B. Comply with ANSI A108.11
- C. Use cementitious backer board for wall surfaces in shower and tub areas, high water or humidity exposure areas, and other locations indicated for use behind thin-set tile.
- D. Install board with long edge perpendicular or parallel to framing. Hold bottom edge 1/4 inch above floor or fixture lip.
- E. Maintain manufacturer's required space between board edges.

### **3.9 ADJUSTING**

- A. Adjust and align metal framing to properly receive final finishes in accordance with required tolerances.
- B. Correct damages, defects, and leave work ready for decoration. Clean compounds from trim. Visible cracks, nail heads, tool marks, waves, distortions, or other similar defects shall not appear in finished work.

### **3.10 CLEANING**

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage finish [surface] or surrounding construction.
- B. Promptly remove joint compound from surfaces not intended to receive compound.

### **3.11 PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. Protect metal framing from damage detrimental to finished work.

**END OF SECTION**

**SECTION 093000****TILING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Related Sections:
  - 1. Section 079200 - Joint Sealants.
  - 2. Section 092900 - Gypsum Board: Cementitious Backing Board.
  - 3. Division 22 – Plumbing - Shower and Floor Drains.
- B. This Project is a registered US Green Building Council “LEED” project.
  - 1. Select locally or regionally fabricated products wherever possible.
  - 2. Select adhesives and sealants meeting LEED requirements.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit product data for each product.
- C. Shop Drawings:
  - 1. Show perimeter conditions and junctions with dissimilar materials.
  - 2. Indicate and detail expansion and control joints.
- D. Samples:
  - 1. Tile: Submit manufacturer's full range of standard color samples of each type tile for Architect's selection.
  - 2. Grout: Submit manufacturer's full range of standard and designated color samples for each type for Architect's selection.
  - 3. Waterproofing membrane: Submit 12 by 12 inch sample.
  - 4. Threshold: Submit full profile sample, 6 inches long, of each type.
- E. Submit following Informational Submittals:
  - 1. Certifications specified in Quality Assurance article.
  - 2. Qualification Data: Manufacturer's and installer's qualification data.
  - 3. Manufacturer's instructions.
- F. Closeout Submittals:
  - 1. Submit under provisions of Section 017700.
  - 2. Maintenance data. Include stain removal methods.
- G. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Mortars, Grouts, and Adhesives.
  - 2. LEED Credit MRc5: Provide manufacturer name and location data for the following materials:
    - a. Mortars, Grouts, and Adhesives.
  - 3. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
    - a. Latex modified setting mortars/adhesives
    - b. Latex Modified Grout
    - c. Joint Filler and Sealants (per 079200)
    - d. Sealant Primers (per 079200)

**1.3 QUALITY ASSURANCE**

- A. Single Source Responsibility:
  - 1. Obtain each type and color tile material required from single source.

2. Obtain setting and grouting materials from one manufacturer to ensure compatibility.
3. Obtain waterproofing membrane from same manufacturer as setting material or from manufacturer approved by setting material manufacturer to ensure compatibility.
- B. Manufacturer Qualifications:
  1. Tile: Minimum 5 years experience in manufacture of tile products.
  2. Setting materials: Minimum 10 years experience in manufacture of setting and grout materials specified.
  3. Waterproofing membrane: Minimum 5 years experience in manufacture of membrane materials specified.
- C. Installer Qualifications: Specializing in tile work having minimum of 5 years successful documented experience with work comparable to that required for this Project.
- D. Floor Tile Slip Resistance: Comply with ANSI A137.1, 2012 edition Dynamic Coefficient of Friction AcuTest of 0.42 wet as tested with BOT-3000 Universal Walkway Tester.
- E. Certifications:
  1. Submit "Master Grade Certificate" for each type of ceramic and quarry tile in accordance with requirements of ANSI A137.1.
  2. Submit manufacturer's certifications that mortars, adhesives and grouts are suitable for intended use.
  3. Submit certification or independent testing, showing floor tile products meet industry standard as slip resistant.

#### **1.4 PRE-INSTALLATION CONFERENCE**

- A. Conduct pre-installation conference in accordance with Section 013100.
- B. Require attendance of installation material manufacturer, tile supplier, tile installer and installers of related work. Review installation procedures and coordination required with related work.
- C. Meeting Agenda includes but is not Limited to:
  1. Surface preparation.
  2. Tile and installation material compatibility.
  3. Setting bed methods and systems.
  4. Elastomeric membrane.

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

- A. Comply with requirements of Section 016000.
- B. Labeling: Comply with ANSI A137.1
- C. Deliver materials in manufacturer's unopened containers, fully identified with name, brand, type and grade.
- D. Protect materials from contamination, dampness, freezing, or overheating in accordance with manufacturer's instructions.
- E. Broken, cracked, chipped, stained, or damaged tile will be rejected, whether built-in or not.
- F. Protect mortar and grout materials against moisture, soiling, or staining.

#### **1.6 ENVIRONMENTAL REQUIREMENTS**

- A. Comply with requirements of referenced standards and recommendations of material manufacturers for environmental conditions before, during, and after installation.
- B. Maintain continuous and uniform building temperatures of not less than 50 degrees F during installation.
- C. Ventilate spaces receiving tile in accordance with material manufacturers' instructions.

#### **1.7 EXTRA STOCK AND MATERIALS**

- A. Deliver 1 percent of installed tile for each type, size, and color.
- B. Store at Project site where directed. Ensure materials are boxed and identified by manufacturer, type and color.



**PART 2 - PRODUCTS****2.1 CERAMIC TILE**

- A. Porcelain Tile:
  - 1. Material: Porcelain based, impervious unglazed ceramic, through body color.
  - 2. Water absorption: Less than 0.1 percent maximum, ASTM C373.
  - 3. Base: Bullnose top, cove bottom, 5 inch height; same characteristics as tile.
  - 4. Static Coefficient of Friction: 0.60 minimum, ASTM C1028.
- B. Trim Shapes: Base, caps, returns and other trim accessories as required; same characteristics as tile including bullnose corners.
- C. Basis of Design Products: Refer to Color and Material Schedule on Drawings.
- D. Other Acceptable Products and Manufacturers:
  - 1. American Olean Tile Company, Dallas, TX.
  - 2. Buchtal Corporation USA, Roswell, GA.
  - 3. Crossville Ceramics Company, Crossville, TN.
  - 4. Dal-Tile Corporation, Dallas, TX.

**2.2 SETTING BED MATERIALS**

- A. Portland Cement With Latex Additive; Thick-Set:
  - 1. Portland Cement: ASTM C150, Type I, from one source only, non-staining and non-air-entraining.
  - 2. Mortar Sand: ASTM C144, free of deleterious materials, well graded.
  - 3. Setting Bed Sand: ASTM C136, 100 percent passing No. 4 sieve.
  - 4. Latex Additive:
    - a. Description: Latex additive serving as replacement for gauging water, for use with site mixed portland cement mortar.
    - b. Quantity: As recommended by latex additive manufacturer to produce workable consistency.
    - c. Acceptable Products:
      - 1) Laticrete 3701 Mortar Admix with Laticrete 226 Thick Bed Mortar Mix, Laticrete International
      - 2) Planicrete AC, Mapei Corporation, Garland, TX.
      - 3) CustomCrete Latex Mortar Admix, Custom Building Products, Seal Beach, CA
- B. Polymer Modified Thinset Dryset Mortar:
  - 1. Description: One or two component system; factory prepared second generation high bond strength dryset mortar and polymer additive; complying with ANSI A118.15.
  - 2. For use at interior and exterior conditions, thermal and shock proof.
  - 3. Acceptable Products:
    - a. Laticrete 254 Platinum, Laticrete International.
    - b. UltraFlex 3, Mapei Corporation, Garland, TX.
    - c. MegaLite Mortar, Custom Building Products, Seal Beach, CA
- C. Medium-Bed Mortar: Factory prepared latex modified mortar; ANSI A118.4 and A118.11.
  - 1. Medium Bed Thickness: 3/8 to 3/4 inch thick floor installations.
  - 2. Shear Bond Strength: ANSI A118.4 based on Porcelain Tile; Minimum 300 psi at 28 days
  - 3. Premium-grade, multipurpose medium-bed applications.
  - 4. Furnish with antimicrobial additives.
  - 5. Color: Gray.
  - 6. Acceptable Products:
    - a. Laticrete 4-XLT, Laticrete International.
    - b. UltraFlex LFT, Mapei Corporation.
    - c. Marble, Granite & Travertine Premium Medium Bed Mortar, Custom Building Products, Seal Beach, CA.

**2.3 GROUTS**

- A. Latex-Modified Sanded Grout: Use at joints larger than 1/8-inch.

1. Description: Latex-modified, factory blended, mildew resistant, sanded, grout consisting of portland cement, graded quartz and additives; comply with ANSI A118.7.
  2. Latex Additive: Integral in mix type as recommended by latex mortar manufacturer.
  3. Color: As selected from manufacturer's full color line.
  4. Acceptable Products:
    - a. Laticrete PermaColor Grout.
    - b. Keracolor S, Mapei Corporation.
    - c. Polyblend Sanded Grout, Custom Building Products, Seal Beach, CA.
- B. Unsanded Latex-Modified Grout for Wall Tile:
1. Description: Latex-modified, factory blended, mildew resistant, non-sanded, grout consisting of portland cement and additives; comply with ANSI A118.7.
  2. Latex Additive: Integral in mix type as recommended by latex mortar manufacturer.
  3. Color: As selected from manufacturer's full color line.
  4. Acceptable Products:
    - a. PermaColor Grout, Laticrete.
    - b. Keracolor U, Mapei Corporation.
    - c. Polyblend Non-Sanded Grout, Custom Building Products, Seal Beach, CA.

## 2.4 MEMBRANES

- A. Sheet Waterproofing Membrane: ASTM D4068. Sheet membrane consisting of non-plasticized CPE (chlorinated polyethylene) elastomeric sheet to specifically designed for use in thick set tile or stone flooring.
1. Use: Contractor's option to use at thick-set shower pan as waterproof membrane.
  2. Nominal thickness: 40 mils.
  3. IAPMO Research and Testing Listed Product.
  4. Seaming Sealant: At waterproof applications. Use at detailing around penetrations and terminations.

## 2.5 ACCESSORIES

- A. Thresholds: Honed marble, Georgia White full width of frame opening, depth as required to accommodate setting system, 3/4 inch minimum thickness unless otherwise detailed, beveled two directions, and radius edges at intersection of bevels to vertical face.
- B. Joint Fillers and Sealants:
1. Provide in accordance with Section 079200 - Joint Sealants.
    - a. Vertical Surfaces: Urethane—Multi-Component;
    - b. Horizontal Surfaces: Urethane—Traffic-Bearing.
    - c. Toilet Rooms: Sanitary Silicone Sealant.
  2. Color: Match grout.
  3. Ensure sealant is chemically compatible with tile, mortar, and grout.
  4. Ensure sealant can physically and chemically withstand environmental conditions normally expected at installation areas.
- C. Adhesives & Sealants (including grouts): Only use adhesives and sealants (grouts) in the interior of the building that comply with VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
1. Current requirement refers to the date on which the materials are installed in the building.
  2. SCAQMD Rule #1168 referenced in Section 018113 that was current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
  3. Interior refers to all building construction that is inside of the exterior weatherproofing material.
- D. Wire Fabric: ASTM A185, 2 by 2 inch, 16/16 welded wire mesh, galvanized.
- E. Primers: As recommended by manufacturer of mortar, grout, and sealant materials.
1. Use primers that comply with VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113.
- F. Substrate Fillers and Sealers: Materials as recommended by manufacturers of setting materials.

- G. Grout Sealers: Water based silicone sealer, clear, VOC compliant, non-yellowing formula, to protect grout from staining.
  - 1. Use sealers that comply with VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113.
  - 2. Products:
    - a. Laticrete 190 Grout Sealer.
    - b. Bostik Instant Pro Grout Sealer.
    - c. AO Tile and Grout Sealer.
    - d. Miracle Sealants Grout Sealer.
    - e. Grout Sealer, Aqua Mix.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify that substrates comply with TCNA tolerance requirements.

#### **3.2 PREPARATION**

- A. Clean substrates.
- B. Prepare surfaces in strict accordance with instructions of manufacturer whose setting materials or additives are being used.
- C. Acid Based Cleaners: Use not permitted.
- D. Scarify concrete substrates with blast track equipment if necessary to completely remove curing compounds or other substances that would interfere with proper bond of setting materials. Clean and maintain substrate in condition required by setting material manufacturer.
- E. Do not seal substrate unless required by manufacturer.
- F. Prime substrate when required by manufacturer.
- G. Waterproofing Membrane:
  - 1. Install membrane in accordance with Section 017300.
  - 2. Flash membrane up adjacent walls and restraining surfaces. Make shower pans watertight, including connection to drain.
  - 3. Apply waterproofing on wall surfaces in shower areas covered by tile.
  - 4. Allow membrane to cure as prior to setting tile.
  - 5. Do not allow construction traffic on membrane.

#### **3.3 INSTALLATION**

- A. General:
  - 1. Install tile materials in accordance with ANSI A108 series, other referenced ANSI and TCNA specifications, and TCNA "Handbook for Ceramic Tile Installation", except for more stringent requirements of manufacturer or these Specifications.
  - 2. Tolerances:
    - a. Lippage: Set top of tiles flush with each other. Exposed face offset between adjacent tiles (lippage); 3/64 inch maximum.
    - b. Joint Width: 1/4 inch, +/- 1/32 inch, unless noted otherwise.
  - 3. Pattern: As indicated. Layout tile work and center tile fields in both directions in each space or on each wall area.
  - 4. Lay out tile to minimize cutting and to avoid tile less than half size.
  - 5. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size.
  - 6. Cut and fit tile at penetrations through tile. Do not damage visible surfaces. Carefully grind edges of tile abutting built-in items. Fit tile at outlets, piping and other penetrations so that plates, collars, or covers overlap tile.
  - 7. Extend tile work into recesses and under or behind equipment and fixtures, to form complete covering without interruptions, except as otherwise indicated. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.
  - 8. Accurately form intersections and returns.

- B. Cementitious Backing Board:
1. Refer to Section 092900 for installation of [vapor retarder and] cementitious backing board.:
  2. Verify cementitious backing board installed for wall surfaces in shower and tub areas, high water or humidity exposure areas, and other locations indicated for use behind thin-set tile.
  3. Fill joints by applying tile setting material and joint reinforcement.
  4. Set top of tiles flush with each other. Exposed face offset between adjacent tiles (lippage); 3/64 inch maximum.
- C. Thick-Set Method:
1. Apply slurry bond coat (thin-set mortar) approximately 1/16 inch thick to concrete surface using flat trowel.
  2. Place thick bed mortar, onto slurry bond coat while coat is still wet and tacky.
  3. Spread prepared mortar approximately one-half desired bed thickness and then lay reinforcing mesh.
  4. Lap wire 3 inches and place additional mortar on top of wire to bring bed to required thickness.
  5. Rod and compact mortar with steel trowel.
  6. Before placing tiles on green or wet screed bed, apply slurry bond coat approximately 1/16 inch thick to mortar using flat trowel.
  7. Apply mortar skim coat to back of each tile immediately prior to placing on bed.
  8. Place tiles in wet slurry coat before surface dries maintaining uniform joints.
  9. After each tile is laid, beat tile with wooden block or rubber mallet to level surface and embed tiles.
  10. Perform beating before mortar takes initial set.
  11. Pitch surface to drain where required.
  12. On hardened screed or mortar bed, install tiles by thin-set method.
- D. Thin-Set Method:
1. Apply mortar with notched trowel using scraping motion to work material into good contact with surface to be covered.
  2. Apply only as much mortar as can be covered within 20 to 30 minutes or while surface is still tacky.
  3. Trowel small quantity of mortar onto back (back-butter) of each tile.
  4. Set tiles in place and rub or beat with small beating block.
  5. Beat or rap tile to ensure proper bond and also to level surface of tile.
  6. Align tile to show uniform joints and allow to set until firm.
  7. Clean excess mortar from surface of tile with wet cloth or sponge while mortar is fresh.
- E. Shower and Floor Drains: Coordinate installation of drains with Division 22.
- F. Threshold:
1. Install at exposed tile edges at doors, unless otherwise indicated.
  2. Use same setting material as used for adjacent field tile.
- G. Grouting And Pointing:
1. After tile has set sufficiently, fill joints with grout until flush with surrounding tile.
  2. Point joints full and remove excess grout. Clean tile thoroughly.
  3. Install sealant in vertical wall joints at interior corners.
  4. Install tile with maximum 25 percent variation of specified grout joint width.
- H. Expansion Joints:
1. Keep expansion joints free of mortar and grout.
  2. Provide expansion joints directly over changes in material, over control and expansion joints in substrate, at juncture of floors and walls, at other restraining surfaces such as curbs, columns, bases, and wall corners, and where recommended by TCNA EJ171 Expansion Joint requirements.
  3. Install sealant in expansion joints.
  4. Provide sealant material at items penetrating tile work, unless otherwise indicated.
  5. Provide sealants and related materials in accordance with cited ANSI and TCNA requirements.

**3.4 ADJUSTING**

- A. Sound tile after setting. Replace hollow sounding units.

**3.5 CLEANING**

- A. Clean tile surfaces in accordance with manufacturer's instructions.
- B. Clean excess mortar from surface with water as work progresses. Perform cleaning while mortar is fresh and before it hardens on surfaces.
- C. Remove grout haze in accordance with grout manufacturer requirements. Do not use acids for cleaning.

**3.6 PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. Prevent wheel and foot traffic from using newly tiled floors for at least 72 hours after installation.
- C. Where temporary use of new floors is unavoidable, supply large, flat boards or plywood panels for walkways over kraft paper.
- D. Protect work so that it will be without any evidence of damage or use at time of acceptance.

**3.7 SCHEDULES**

- A. Floor Tile Thin Set Installation Schedule:
  - 1. Description: Thin set.
  - 2. Mortar: Portland cement with latex additive; thin-set.
  - 3. Grout: Latex-modified.
  - 4. TCNA system: F113.
- B. Floor Tile Medium Bed Set Installation Schedule:
  - 1. Description: Medium bed, dry-set.
  - 2. Location: Refer to finish schedule.
  - 3. Tile Type: Large Format; larger than 12 x 12 inches.
  - 4. Mortar: Medium bed.
  - 5. Grout: Latex-modified.
  - 6. Installation: Install in accordance with manufacturer's instructions.
- C. Wall Tile Thin Set Installation Schedule:
  - 1. Description: Interior partitions.
  - 2. Mortar: Dryset Mortar with Polymer Additive; thin-set.
  - 3. Grout: Unsanded latex-modified or Latex-modified.
  - 4. TCNA System: W243.
- D. Shower Floors and Walls Installation Schedule:
  - 1. Description: Interior partitions, wet areas and shower receptor.
  - 2. Substrate: Cementitious backing board and concrete slab.
  - 3. Membrane: Elastomeric, extending to ceiling line.
  - 4. Mortar:
    - a. Leveling bed: Latex modified portland cement.
    - b. Floor and wall setting bed: Quick Setting Thin-Set Mortar.
  - 5. Grout:
    - a. Wall: Unsanded latex-modified.
    - b. Floor: Latex-modified.
  - 6. TCNA System: W244 and B415.

**END OF SECTION**



**SECTION 095100**  
**ACOUSTICAL CEILINGS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes: Suspended exposed grid ceiling system.
- B. Products Furnished But Not Installed Under This Section: Anchors or inserts for suspension system.
- C. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select materials to maximize use of recycled materials.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 SYSTEM REQUIREMENTS**

- A. Interface With Other Systems: Coordinate layout and installation of acoustical ceiling units and suspension system components with other work supported by, or penetrating through, ceilings, including light fixtures, HVAC equipment, fire-suppression system components and partition system.
- B. Interior Suspended Ceilings, Soffits, and Bulkheads: Maintain deflection of not more than L/360 of distance between supports.

**1.3 SUBMITTALS**

- A. General: Submit following items in accordance with Section 013300.
- B. Product Data: Submit product data for each acoustical material and suspension system component.
- C. Samples:
  - 1. Submit samples of each acoustical ceiling unit and exposed suspension component specified for review of color and texture.
  - 2. Show full range of texture and color expected in completed Work in each sample submission.
  - 3. Panel: Submit 12 inch by 12 inch samples of each type.
  - 4. Exposed Tees and Moldings: Submit one foot lengths of each type suspension system, including moldings.
- D. Submit following Informational Submittals:
  - 1. Qualification Data: Installer's qualification data.
- E. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Acoustical Panels
    - b. Suspension System (steel)
  - 2. LEED Credit MRc4: Provide Recycled content data for each different product type, size and manufacturer used for the following materials:
    - a. Acoustical Panels
    - b. Recycled content materials claims shall meet the following requirements:
      - 1) Defined in accordance with the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e). This document is available at [www.ftc.gov/bcp/grnrule/guides980427.htm](http://www.ftc.gov/bcp/grnrule/guides980427.htm).
      - 2) The recycled content of each material shall be provided for the percentage by weight of post-consumer and pre-consumer content, as defined in the document referenced above, used in each product type used.
  - 3. LEED Credit MRc5: Provide manufacturer name and location data for the following materials:
    - a. Acoustical Panels

- b. Suspension System (steel)

#### **1.4 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in acoustical ceiling work having minimum of 3 years successful documented experience with work comparable to that indicated and specified.
- B. Regulatory Requirements: Conform to local code for combustibility requirements for materials.

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

- A. Deliver, store, handle, and protect products in accordance with Section 016000.

#### **1.6 ENVIRONMENTAL REQUIREMENTS**

- A. Permit acoustical materials to reach room temperature and a stabilized moisture content before installation.
- B. Maintain uniform temperature of minimum 60 degrees F and humidity of 20 percent to 40 percent prior to, during, and after installation.

#### **1.7 SEQUENCING**

- A. Do not install interior acoustical ceilings until space is enclosed and weatherproof, wetwork in space is completed and nominally dry, and work above ceilings is complete.

#### **1.8 EXTRA STOCK AND MATERIALS**

- A. Furnish under provisions of Section 017700.
- B. Deliver one percent of installed quantity of each type and color of panel and suspension system component installed.
- C. Store at Job Site where directed. Ensure materials are boxed and identified by manufacturer, style and color.
- D. Furnish full size units, matching material installed.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers:
  - 1. Acoustic Panel:
    - a. Armstrong World Industries, Inc., Lancaster, PA.
    - b. Certainteed Ceilings, Tampa, FL.
    - c. USG Interiors, Inc., Chicago, IL.
  - 2. Suspension System:
    - a. Armstrong World Industries, Inc., Lancaster, PA.
    - b. Chicago Metallic, Chicago, IL.
    - c. Worthington Steel, Malvern, PA.
    - d. USG Interiors, Inc., Chicago, IL.

#### **2.2 MATERIALS**

- A. Maximize use of recycled materials with minimum of 50 percent by weight.
- B. Acoustic Tile (ACT-1):
  - 1. Size: 24 by 24 inches.
  - 2. Thickness: 5/8 inch.
  - 3. Light Reflectance: 0.80
  - 4. NRC: 0.55.
  - 5. CAC Range: 35.
  - 6. Fire classification: Class A.
  - 7. Joint: Lay-in.
  - 8. Edge Profile: Angled Tegral.
  - 9. Color: White



10. Surface Finish: Factory-applied washable vinyl latex paint.
11. Acceptable Product: Refer to Color and Material Schedule on Drawings.
- C. Acoustical Tile (ACT-2): Moisture Resistant.
  1. Size: 24 by 24 inches.
  2. Thickness: 5/8 inch.
  3. Light Reflectance: 0.80.
  4. NRC: 0.55.
  5. CAC: 40.
  6. Fire Classification: Class A.
  7. Joint: Lay-in.
  8. Edge: Square.
  9. Color: White.
  10. Grid: Aluminum.
  11. Surface Finish: Ceramic and mineral fiber composite.
  12. Acceptable Product: Refer to Color and Material Schedule on Drawings.
- D. Exposed Suspension System:
  1. Grid: ASTM C635, intermediate duty, exposed T; wide-face; steel capped; double-web; interlocking components; designed to resist seismic lateral pullout.
  2. Grid Materials: Cold-rolled steel with galvanized coating.
  3. Grid Finish: White baked-on enamel.
  4. Acceptable Products:
    - a. Prelude ML, Armstrong World Industries, Inc., Lancaster, PA.
    - b. 211, Chicago Metallic, Chicago, IL.
    - c. DX 24, USG Interiors, Inc., Chicago, IL.
- E. Exposed Aluminum Suspension System at Moisture Resistant Panels:
  1. Grid: ASTM C635, light duty, exposed T; wide-face; double-web; interlocking components; designed to resist seismic lateral pullout.
  2. Grid Materials: Aluminum, with aluminum caps.
  3. Grid Finish: Color as selected by Architect.
- F. Suspension System Accessories:
  1. Manufacturer's standard trim and edge moldings to suit suspension system requirements; same finish as suspension system.
  2. Provide edge moldings to fit penetrations exactly, including circular penetrations.
  3. Provide hold-down clips, required for suspended grid system.
- G. Attachment Devices:
  1. General: Size devices for 5 times loads imposed by complete system.
  2. Hanger Wire Form Inserts: No. 6 galvanized wire loop and 26 gage galvanized shell, or 14 gage galvanized steel strap with 5/16 inch hole.
  3. Hangers:
    - a. As recommended by manufacturer and as required to comply with structural classification.
    - b. Wire Hangers: ASTM A641, not less than 12 gage, galvanized carbon steel wire, soft temper, pre-stretched.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.

#### **3.2 INSTALLATION**

- A. General: Install acoustical panel ceilings to comply with publications referenced below per manufacturer's instructions and Cisca "Ceiling Systems Handbook."
  1. Install system in accordance with ASTM C636, except for more stringent requirements of manufacturer or these specifications.

2. CISCA Recommendations for Acoustical Ceilings: Comply with CISCA "Recommendations for Direct-Hung Acoustical Tile and Lay-In Panel Ceilings."
  3. UBC. Standard No. 25-2, "Metal Suspension Systems for Acoustical Tile and for Lay-In Panel Ceilings."
- B. Install system capable of supporting imposed loads with maximum deflection of 1/360.
- C. Hanger Installation:
1. Coordinate location of hangers with other work.
  2. Secure hangers or rods as required to structural support by connecting directly to structure where possible, otherwise connect to inserts, clips or other anchorage devices or fasteners.
  3. Do not attach hangers directly to metal roof deck. Provide supplementary framing if necessary.
  4. Space hangers not more than 6 inches from each ceiling edge.
  5. Provide sufficient additional hangers for support of fixtures and other items supported by ceiling suspension system to prevent eccentric deflection or rotating of supporting runners. Provide hangers on crossrunners within 6 inches of grid intersections to support light fixtures.
  6. Hang system independent of columns, ducts, pipes, and conduit.
  7. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
  8. If ducts or other equipment prevent the regular spacing of hangers, provide trapeze or supplementary support members to span extra distance.
- D. Center system on room axis leaving equal border units.
- E. Edge Molding Installation:
1. Install edge moldings where ceilings abut walls, partitions or other penetration elements.
  2. Miter cut inside and outside corners to provide flush, tight, hairline joints.
- F. Panel Installation:
1. Install in level and uniform plane; free from twist, warp and dents.
  2. Rest edges on flanges of tees.
  3. Support perimeters on wall moldings.
  4. Neatly scribe and cut boards for accurate fit at borders, interruptions, and penetrations by other work.
  5. Lay directional patterned units one way with pattern parallel to longest [shortest] room axis.
- G. Site Tolerances:
1. Level completed assembly to tolerance of 1/8 inch in 10 feet.
  2. Variation from Plumb of Grid Members Caused by Eccentric Loads: Two degrees maximum.

### 3.3 CLEANING

- A. Clean exposed surfaces of exposed metal ceiling grid, trim, and edge moldings. Comply with manufacturers' instructions for cleaning and touchup of minor finish damage.
- B. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage, including dented and bent units.

### END OF SECTION

**SECTION 096500  
RESILIENT FLOORING**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Related Sections:
  - 1. Section 096800 - Carpet.
- B. This project is a registered US Green Building Council "LEED" project.
  - 1. Select materials to maximize use of recycled materials.
  - 2. Verify if any product has any recycled content.
  - 3. Select locally or regionally fabricated products wherever possible.
  - 4. Verify if a local plant (within 500 miles of jobsite) can supply the product.
  - 5. Low-Emitting Materials: Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort.
  - 6. Adhesives and sealants shall comply with VOC and chemical component limits of SCAQMD VOC Limit requirements.
  - 7. Use primers that comply with VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) VOC Content Limits for Architectural Coatings.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  - 1. Submit product information for each product.
    - a. Include information for accessories and other required components.
    - b. Include color charts for finish indicating manufacturer's full range of colors available for selection.
- C. Samples:
  - 1. Illustrate: Style, pattern, color, and size.
  - 2. Verification of Selection:
    - a. Quantity: Four
    - b. Feature Strip Materials: Submit 12 inch lengths.
    - c. Wall Base: Submit 12 inch lengths.
- D. Submit following Informational Submittals:
  - 1. Manufacturer's Instructions.
- E. Closeout Submittals:
  - 1. Submit under provisions of Section 017700.
  - 2. Maintenance data. Include polishing/waxing information.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Resilient base.
  - 2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post -consumer recycled content of metal materials based on material cost per weight for the following materials:
    - a. Resilient base.
    - b. Recycled content materials claims shall meet the following requirements:
      - 1) Defined in accordance with the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e). This document is available at [www.ftc.gov/bcp/grnrule/guides980427.htm](http://www.ftc.gov/bcp/grnrule/guides980427.htm).
      - 2) The recycled content of each material shall be provided for the percentage by weight of post-consumer and pre-consumer content, as defined in the document referenced above, used in each product type used.

3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
  - a. Resilient base.
4. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
  - a. Adhesives and sealants
5. LEED Credit EQc4.2: Submit paint and coating VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Submit the product manufacturer's most current VOC emissions data:
  - a. Primers
6. LEED Credit EQc4.3: Provide FloorScore documentation demonstrating that all hard surface flooring submitted for installation are FloorScore certified and meet most current VOC emissions data:
  - a. Resilient base.

### **1.3 QUALITY ASSURANCE**

- A. Single Source Responsibility: Obtain each type, color, and pattern of resilient flooring products from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
- B. Regulatory Requirements: Comply with local regulations controlling use of volatile organic compounds for installation products.

### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Deliver materials to Job Site in manufacturer's unopened containers clearly marked with manufacturer's name, brand, size, thickness, grade, color, and design.

### **1.5 PROJECT CONDITIONS**

- A. Environmental Requirements:
  1. Maintain minimum air and subfloor temperature required by adhesive manufacturer in spaces to receive products for at least 72 hours prior to installation, during installation, and for not less than 48 hours after installation.
  2. Store products in spaces where they will be installed for at least 72 hours before beginning installation to achieve temperature stability.
  3. Do not install products until they are at same air and subfloor temperature as space where they are to be installed.
  4. After installation, maintain minimum air and subfloor temperature of 55 degrees F in areas where work is completed.

### **1.6 SEQUENCING**

- A. Install products after other finishing operations, including painting, have been completed.
- B. Do not install resilient products on top of concrete slabs until they are cured and are sufficiently dry to achieve bond with adhesive as determined by resilient material manufacturer's recommended bond and moisture test.
- C. Coordinate installation of resilient base, reducer strips, and transition strips with installation of:
  1. Carpet specified in Section 096800.

### **1.7 MAINTENANCE**

- A. Maintenance Materials:
  1. Furnish under provisions of Section 017700.

2. Furnish extra resilient base in quantity equal to 2 percent of total material furnished but not less than:
  - a. 50 feet of each type and color base installed.
  - b. Resilient Base: Provide in roll form of each different composition and color installed.
3. Store at job site where directed. Ensure boxes are identified by manufacturer, pattern, style, and color.

## **PART 2 - PRODUCTS**

### **2.1 MANUFACTURERS**

- A. Acceptable Resilient Base Manufacturers:
  1. Armstrong Floor Division, Armstrong World Industries, Inc., Lancaster, PA.
  2. Allstate Rubber Corp., Ozone Park, NY
  3. Burke/Mercer Products Company, Inc., Eustis, FL.
  4. Johnsonite, Chagrin Falls, OH.
  5. Roppe Corporation, Fostoria, OH.

### **2.2 MATERIALS**

- A. Acceptable Products: Refer to Color and Material Schedule on Drawings.
- B. Resilient Base:
  1. Description:
    - a. ASTM F1861.
      - 1) Type: TS (Rubber).
      - 2) Style: Straight, toe-less type for carpet areas; set-on type with standard toe for other areas.
    - b. Thickness: 0.125 inch minimum.
    - c. Height: 4 inches nominal.
    - d. Provide in roll form to accommodate installation with minimum seaming.
    - e. Corners: Field fabricated.
    - f. Colors: Selected by Architect from manufacturer's full range of colors.

### **2.3 ACCESSORIES**

- A. Primers and Adhesives:
  1. Water resistant, will not re-emulsify in presence of water vapor.
  2. Materials required by resilient product manufacturer for particular product and substrate moisture content and condition.
  3. Removable adhesive with antimicrobial additive; approved by resilient product manufacturer.
  4. Use primers that comply with VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113.
  5. LEED Requirements - LEED Credit EQc4.1 - Adhesives and Sealants shall comply with VOC content as determined by LEED requirements; VOC content shall not exceed 50 grams/liter.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Site Verification of Conditions:
  1. Verify that floor and wall surfaces to receive base are free of substances which may adversely affect adhesive and resilient materials.

### **3.2 PREPARATION**

- A. Remove ridges, bumps, trowel marks and protrusions from substrate.
- B. Prime substrate in accordance with manufacturer's requirements.
- C. Unroll rolled products minimum 24 hours before installation, unless not required by manufacturer.

**3.3 INSTALLATION****A. General:**

1. Comply with Section 017300.
2. Adhesive:
  - a. Apply with notched trowel at rate and in pattern required by manufacturer.
  - b. Gun application is not permitted.
  - c. Apply to provide continuous bond between resilient material and substrate. Do not allow adhesive to bleed through joints.
  - d. Spread only enough adhesive to permit installation of materials before adhesive's initial set.
  - e. Allow solvent to flash off and adhesive to become tacky in accordance with manufacturer's requirements before applying resilient product.
3. Scribing:
  - a. Produce tight hairline joints.
  - b. Scribe to walls, columns, cabinets, floor outlets, floor penetrations, and other appurtenances.
  - c. Scribe, cut and fit exposed edges at adjoining construction and neatly abut.

**B. Resilient Base:**

1. Use longest lengths possible; pieces less than 10 feet long are not permitted. Seams are not permitted between wall corners spaced less than 10 feet apart.
2. Fit joints straight, tight, and vertical.
3. Install on solid substrate backing.
4. Bond tight to wall and floor surfaces.
5. Scribe to door frames and other interruptions.
6. Outside Corners: Wrap base around corner after using cove base groover tool by Gundlach to make V-shaped vertical cut in back of base at corner.
7. Inside Corners:
  - a. Butt and cope, or mitered [Use corner units].
  - b. Do not wrap base around corners.
8. Align tops of adjacent sections.
9. Change from cove base to straight base at flooring transition strips.

**3.4 CLEANING**

- A. Immediately remove excess adhesive from surfaces without damage.
- B. Replace scuffed, scratched, broken, and discolored products. Re-install loose products.
- C. Clean surfaces in accordance with manufacturer's requirements. Do not use materials and methods which may damage finish and surrounding construction.

**3.5 PROTECTION**

- A. Protect in accordance with Section 017300.
- B. Protect work from damage from subsequent construction operations so there will be no indication of use and damage at time of acceptance.

**END OF SECTION**

**SECTION 096566**  
**RESILIENT ATHLETIC FLOORING**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Related Sections:
  - 1. Section 033000 - Cast-in-Place Concrete.
- B. This project is a registered US Green Building Council "LEED" project.
  - 1. Select materials to maximize use of recycled materials.
  - 2. Verify if any product has any recycled content.
  - 3. Select locally or regionally fabricated products wherever possible.
  - 4. Verify if a local plant (within 500 miles of jobsite) can supply the product.
  - 5. Low-Emitting Materials: Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort.
  - 6. Adhesives and sealants shall comply with VOC and chemical component limits of SCAQMD VOC Limit requirements.
  - 7. Use primers that comply with VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD).

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  - 1. Submit product information for each product.
  - 2. Include information for accessories and other required components.
  - 3. Include color charts for finish indicating manufacturer's full range of colors available for selection, including game markings.
- C. Samples:
  - 1. Illustrate: Style, pattern, color, and size.
  - 2. Initial selection:
    - a. Quantity: One Manufacturer's full range of pattern and color chip samples of each type for Architect's initial selection.
    - b. Size: 4 inches square, minimum.
- D. Submit following Informational Submittals:
  - 1. Certifications specified in Quality Assurance article.
  - 2. Qualification Data: Installer's qualification data.
  - 3. Manufacturer's Instructions:
    - a. Application temperature and humidity range.
    - b. Floor moisture content range.
    - c. Bond and moisture test procedures including frequency and duration.
    - d. Special procedures.
    - e. Perimeter conditions requiring special attention.
- E. Closeout Submittals: Include polishing/waxing information.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Sheet Flooring
  - 2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post-consumer recycled content of recycled materials based on material cost per weight for the following materials:
    - a. Sheet Flooring

- b. Recycled content materials claims shall meet the following requirements:
    - 1) Defined in accordance with the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e). This document is available at [www.ftc.gov/bcp/gmrule/guides980427.htm](http://www.ftc.gov/bcp/gmrule/guides980427.htm).
    - 2) The recycled content of each material shall be provided for the percentage by weight of post-consumer and pre-consumer content, as defined in the document referenced above, used in each product type used.
3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
  - a. Sheet Flooring
4. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
  - a. Adhesives and sealants
5. LEED Credit EQc4.2: Submit paint and coating VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Submit the product manufacturer's most current VOC emissions data:
  - a. Primers
6. LEED Credit EQc4.3: Provide FloorScore documentation demonstrating that all hard surface flooring submitted for installation are FloorScore certified and meet most current VOC emissions data:
  - a. Sheet Flooring

### **1.3 QUALITY ASSURANCE**

- A. Single Source Responsibility: Obtain athletic flooring products from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
- B. Installer Qualifications: Acceptable to manufacturer with experience on at least 5 projects of similar nature in past 5 years.
- C. Regulatory Requirements: Comply with local regulations controlling use of volatile organic compounds for installation products.
- D. Certifications:
  1. Manufacturer's certification that products furnished for project meet or exceed specified requirements.
  2. Installer Certification: Manufacturer's certification attesting that Installer is trained and approved for application of materials.

### **1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Deliver materials to Project Site in manufacturer's unopened containers clearly marked with manufacturer's name, brand, size, thickness, grade, color, and design.
- C. Store flooring materials within installation location for minimum of 7 days prior to commencing installation to allow materials to acclimatize.
- D. Ensure installation areas maintain temperature range of 55 to 80 degrees F with relative humidity between 35 and 50%.
- E. Ensure installation area concrete slabs have moisture content of 3 percent or less with vapor transmission rate less than 4 pounds per 1000 sq. ft.

### **1.5 PROJECT CONDITIONS**

- A. Environmental Requirements:
  1. Comply with requirements of athletic flooring material supplier's requirements.



2. Maintain minimum air and subfloor temperature required by adhesive manufacturer in spaces to receive products for at least 72 hours prior to installation, during installation, and for not less than 48 hours after installation.
3. Store products in spaces where they will be installed for at least 72 hours before beginning installation to achieve temperature stability.
4. Do not install products until they are at same air and subfloor temperature as space where they are to be installed.
5. After installation, maintain minimum air and subfloor temperature of 55 degrees F and under 50% relative humidity in areas where work is completed.

#### **1.6 SEQUENCING**

- A. Install products after other finishing operations, including painting, have been completed.
- B. Do not install athletic flooring products on top of concrete slabs until they are cured and are sufficiently dry to achieve bond with adhesive as determined by athletic material manufacturer's recommended bond and moisture test.

#### **1.7 WARRANTY**

- A. Comply with provisions of Section 017700.
- B. Warrant rubber athletic flooring to be free from defects in material and workmanship for 3 years. Provide 10-year warranty if "Sport Court" floor is selected.
- C. Coverage to include but not limited to:
  1. Buckling, blistering, open joints, and loosening.
  2. Deterioration of finishes beyond normal wear.

### **PART 2 - PRODUCTS**

#### **2.1 MATERIALS**

- A. Athletic Rubber Floor:
  1. Acceptable Product: Refer to Color and Material Schedule on Drawings.
- B. Other Acceptable Manufacturers: As approved by Architect.

#### **2.2 ACCESSORIES**

- A. Primers and Adhesives:
  1. Waterproof.
  2. Adhesive Materials required by athletic flooring product manufacturer for particular product and substrate moisture content and condition.
    - a. LEED Requirements - LEED Credit EQc4.1 - Adhesives and Sealants shall comply with VOC content as determined by LEED requirements; VOC content shall not exceed 50 grams/liter.
  3. Materials required by athletic flooring product manufacturer for particular product and substrate moisture content and condition.
  4. Concrete Primer - One-component polyurethane adhesive primer specially designed for priming concrete surfaces for polyurethane coatings.
    - a. Use primers that comply with VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113.
  5. Adhesives & Sealants: Comply with VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
    - a. Current requirement refers to the date on which the materials are installed in the building.
    - b. SCAQMD Rule #1168 referenced in Section 018113 that was current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
  6. Patching Compounds: As recommended by manufacturer.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions and proceed with work when substrates are ready.
- B. Site Verification of Conditions:
  - 1. Verify that concrete floor moisture content, alkalinity, carbonization, and dusting are within floor manufacturer's limitations.
  - 2. Verify that floor and wall surfaces to receive flooring and base are free of substances which may adversely affect adhesive and resilient materials.
- C. Ensure concrete has cured 60 days minimum.

**3.2 PREPARATION**

- A. General contractor shall furnish and install concrete subfloors. Verify slab has been steel troweled and finished smooth to a tolerance of 1/8" in 10'. Grind high spots level, and fill low spots with approved leveling compound.
- B. Verify no concrete curing or hardening agents have been applied to concrete subfloor.
- C. Bond and Moisture Tests:
  - 1. Perform in accordance with flooring manufacturer's requirements to determine suitability of concrete subfloor for receiving athletic flooring with regard to moisture content and curing compounds.
  - 2. Test concrete slabs in accordance with ASTM F710 to ensure moisture content is 3 percent or less.
  - 3. Test with calcium chloride in accordance with ASTM F1869 to ensure vapor transmission rate less than 4 pounds per 1000 sq. ft.
  - 4. Ensure concrete is within manufacturer's recommended limits prior to flooring installation. If subfloor's moisture vapor permeance is in excess of flooring manufacturer's limits for issuing warranty, prepare slab and apply vapor retarder underlayment system acceptable to manufacturer, or use manufacturer's adhesive for application on substrates containing excessive moisture.
  - 5. Submit report to Owner.
- D. Remove ridges, bumps, trowel marks and protrusions from substrate.
- E. Fill depressions, low spots, cracks, joints, holes, indentations, and other defects with leveling and patching compounds.
- F. Clean substrate to remove paint, dirt, oil, grease, sealers, release agents, hardening compounds, curing compounds, residual adhesives, and harmful substances which could impair performance of adhesive materials used with athletic flooring products.
- G. Vacuum clean substrate.
- H. Prime substrate in accordance with manufacturer's requirements.
- I. Unroll rolled products minimum 24 hours before installation, unless not required by manufacturer.

**3.3 INSTALLATION**

- A. Primer - Apply concrete primer to clean concrete using roller or spray equipment in accordance with manufacturer's recommendations.
- B. Install flooring materials in accordance with Section 017300, approved shop drawings, and manufacturer's written instructions.
- C. Maintain temperature range of 55 to 80 degrees F with relative humidity between 35 and 50% prior to, during, and after installation.
- D. Flooring:
  - 1. Unroll flooring and allow to relax.
  - 2. Cut and adjust floor prior to adhesion.
  - 3. Thoroughly mix and spread adhesive material.
  - 4. Unroll flooring into freshly applied adhesive.
  - 5. Provide tight joints without compression fit.

- 6. Hold seams in place with suitable weights for 12 hours.
- E. Remove all excess and waste materials from the area of work. Dispose of empty containers in accordance with federal and local statutes.

### **3.4 CLEANING**

- A. Immediately remove excess material from surfaces without damage.
- B. Clean surfaces in accordance with manufacturer's requirements. Do not use materials and methods which may damage finish and surrounding construction.

### **3.5 PROTECTION**

- A. Prohibit traffic on floor finish for minimum of 48 hours after installation.
- B. Protect work from damage from subsequent construction operations so there will be no indication of use and damage at time of acceptance.
- C. After synthetic floors are installed, area to be kept locked by general contractor to allow curing time for system. No other trades or personnel are allowed on floor until accepted by Owner.

**END OF SECTION**



**SECTION 096800****CARPETING****PART 1 - GENERAL****1.1 SUMMARY**

- A. Related Sections:
  - 1. Section 096500 - Resilient Flooring: Resilient base.
- B. This project is a registered US Green Building Council "LEED" project.
  - 1. Select materials to maximize use of recycled materials.
  - 2. Select locally or regionally fabricated products wherever possible.
  - 3. Low-Emitting Materials: Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort.
  - 4. Verify if a local plant (within 500 miles of jobsite) can supply the product.
  - 5. Verify if any product has any recycled content.

**1.2 SYSTEM DESCRIPTION**

- A. Furnish carpet capable of providing following performance characteristics:
  - 1. Static propensity:
    - a. Test: AATCC 134.
    - b. Result: 3.5 kV maximum at 20 percent RH and 70 degrees F using step and scuff tests with neolite and leather soles.
    - c. Prior to performing test, ensure carpet has been cleaned of applied surface finishes.
  - 2. Colorfastness to Light:
    - a. Test: AATCC 16E with Xenon arc light source.
    - b. Results: Minimum rating of 4.0 on AATCC gray scale after 60 hours of continuous exposure.
    - c. Test specified carpet and color.
  - 3. Tuft Bind:
    - a. Test: ASTM D1335.
    - b. Results: 20 lbf minimum.
  - 4. Antimicrobial:
    - a. Test: AATCC 174.
    - b. Results: Part II, minimum 90 percent reduction of Gram positive and negative bacteria. Part III, no growth on fiber and backing.
- B. Regulatory Requirements:
  - 1. Ensure flammable components comply with applicable portions of local, state, and federal codes, laws, and ordinances for toxicity, flame spread and smoke developed indices.
  - 2. Fire Resistance Ratings: Provide carpet and underlayment which complies with following requirements as determined by independent testing laboratory acceptable to authorities having jurisdiction:
    - a. Methenamine Pill Test: DOC FF 1-70, Pass.
    - b. Critical Radiant Flux: ASTM E648, Class I, 0.45 watts/cm<sup>2</sup> minimum.
  - 3. Accessibility:
    - a. Carpet Construction: Maximum total pile height/thickness 1/2 inch.
  - 4. Comply with local regulations controlling use of volatile organic compounds for installation products.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit product data for each product.
- C. Shop Drawings showing columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet. Indicate the following:
  - 1. Carpet type, color, and dye lot.

2. Locations where dye lot changes occur.
  3. Seam locations, types, and methods.
  4. Type of subfloor.
  5. Type of installation.
  6. Pattern type, repeat size, location, direction, and starting point.
  7. Pile direction.
  8. Type, color, and location of insets and borders.
  9. Type, color, and location of edge, transition, and other accessory strips.
  10. Transition details to other flooring materials.
- D. Samples: Submit manufacturer's full range of carpet patterns and colors samples for each scheduled type.
- E. Submit following Informational Submittals:
1. Certifications specified in Quality Assurance article.
  2. Qualification Data: Manufacturer's and installer's qualification data.
  3. Manufacturer's instructions.
- F. Closeout Submittals:
1. Submit under provisions of Section 017700.
  2. Maintenance data.
  3. Warranty: Submit specified warranty.
- G. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Sheet Carpet
  2. LEED Credit MRc4: Provide Recycled content data for each different product type, size and manufacturer used for the following materials:
    - a. Sheet Carpet
    - b. Recycled content materials claims shall meet the following requirements:
      - 1) Defined in accordance with the Federal Trade Commission document, Guides for the Use of Environmental Marketing Claims, 16 CFR 260.7 (e). This document is available at [www.ftc.gov/bcp/grnrule/guides980427.htm](http://www.ftc.gov/bcp/grnrule/guides980427.htm).
      - 2) The recycled content of each material shall be provided for the percentage by weight of post-consumer and pre-consumer content, as defined in the document referenced above, used in each product type used.
  3. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
    - a. Adhesives
  4. LEED Credit EQc4.3: Provide Carpet VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
    - a. Carpet

#### 1.4 QUALITY ASSURANCE

- A. Single Source Responsibility: Furnish carpet from one manufacturer for entire Project, unless otherwise acceptable to Architect.
- B. Manufacturer Qualifications: Company specializing in manufacturing of carpet with minimum 5 years experience.
- C. Installer Qualifications: Acceptable to manufacturer with experience on at least 5 projects of similar nature in past 5 years.

- D. Product Recyclability:
1. Product must meet FTC guides for recyclability and must be one hundred percent (100%) closed-loop recyclable back into carpet. Products containing both recyclable and non-recyclable components, manufacturer must adequately report which portions of the product are recyclable per FTC guides 16 CFR section 260.7(d). Note: A manufacturer cannot claim that a product or any portion of a product that is incinerated is recyclable, even if incineration is used to produce heat and power (i.e. waste-to-energy) per FTC guides 16 CFR section 260.7 (d) example 3.
  2. Recyclability of product installed must be the same as that claimed by manufacturer and required by Project requirements.
- E. Manufacturer's Recycling Program:
1. Manufacturer must have or create a collection and recovery system for product and a fully established, currently operational recycling program at time of bid per FTC guides Section 260.7 (d).
  2. Manufacturer must be able to reclaim and recycle 100% of existing carpet of similar composition back into carpet at time of bid.
  3. Manufacturer must have product a take back program and be able to reclaim and recycle 100% of installed product back into carpet at the end of its service life at time of bid. Claiming a product is recyclable based on future expectation of technology, equipment, process or availability of that product as feed stock is not acceptable. Recycling process must be available for viewing.
  4. Collection and recycling program must be verified by an independent, neutral third-party organization, such as Scientific Certification Systems.
  5. Manufacturer must have written guarantee that 100% of the recovered product will be recycled and that no portion of the product will be landfilled or incinerated (including waste-to-energy).
- F. Manufacturer's Environmental Commitment:
1. A manufacturer's environmental commitment will be reflected by its corporate culture and measured by the goals, policies and programs that have been instituted to improve the environmental performance of its operations. Evidence of this commitment must include:
    - a. All products produced by the manufacturer must meet FTC guides for recyclability and be 100% recyclable in a fully established, currently operational recycling program 16 CFR section 260.7 (d).
    - b. All products produced by the manufacturer, including recycled content products, must be 100% closed-loop recyclable back into carpet.
  2. Manufacturer must show evidence of a positive and continuing improvement in source reduction and the reduction of energy, water, waste and air emissions.
  3. Manufacturer must fully comply with FTC Part 260 "Guides for the Use of Environmental Marketing Claims," with respect to advertising, labeling, product inserts, catalogs and sales presentations of all its carpet products submitted and sold. Certification signed by an officer of the manufacturer stating the manufacturer complies with these guides maybe required for submittal upon request.
- G. Certifications:
1. Manufacturer's certification that products furnished for project meet or exceed regulatory and performance requirements included as part of System Description article.
  2. Contractor's and installer's certification that products are installed in accordance with Contract Documents.
  3. Manufacturer's certification that carpet furnished for project meets one of following requirements:
    - a. Indoor Air Quality Carpet Testing, Carpet and Rug Institute, include CRI Certification number (Green Label).
    - b. EPA Guidelines for Total Volatile Organic Emissions.
  4. Antimicrobial: Environmental Protection Agency registration numbers for antimicrobial agent in products furnished.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Deliver materials to project site in manufacturer's unopened containers clearly marked with manufacturer's name, brand, size, thickness, grade, color and design.

**1.6 PROJECT CONDITIONS**

- A. Environmental Requirements:
  - 1. Comply with manufacturer's written requirements under which products can be installed.
  - 2. Store carpet materials in spaces where they will be installed for at least 48 hours before beginning installation.
  - 3. Maintain minimum temperature of 65 degrees F and maximum relative humidity of 65 percent for minimum of 24 hour prior to installation. Maintain temperature for 72 hours after installation.
- B. Substrate Conditions: Do not install carpet over concrete slabs until they are cured and are sufficiently dry to achieve bond with adhesive as determined by manufacturer's bond and moisture tests.

**1.7 SEQUENCING**

- A. Install carpet after other finishing operations, including painting, have been completed.

**1.8 WARRANTY**

- A. Comply with provisions of Section 017700.
- B. Warrant installed carpet, adhesives, and accessories for 2 years. Include coverage for:
  - 1. Shrinkage and stretching.
  - 2. Color irregularity.
  - 3. Delamination.
  - 4. Tuft bind and edge unraveling.
  - 5. Peaking and doming.
  - 6. Failure to perform as specified.
- C. Wear: Provide carpet wear warranty signed by authorized representative of carpet manufacturer stating that surface wear is not to exceed 10 percent by weight for 10 year period from date of installation.
- D. Static Propensity: Provide warranty for life of carpet that static propensity will not exceed performance specified in System Description article

**1.9 EXTRA STOCK MATERIALS**

- A. Furnish under provisions of Section 017700.
- B. Furnish extra carpet tile in quantity equal to 5 percent of total material furnished but not less than one unopened box of tile for each type, pattern and color.
- C. Store at Project Site where directed. Ensure materials are identified by manufacturer, style, and color.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Acceptable Tufted Carpet Manufacturers:
  - 1. Bentley Mills, Inc., City of Industry, CA.
  - 2. Karastan Contract, Atlanta, GA.
  - 3. Lees Commercial Carpets, Greensboro, NC.
  - 4. Mohawk Commercial Carpet, Atlanta, GA.
  - 5. Shaw Industries, Dalton, GA.



**2.2 CARPET**

- A. Carpet: CPT-1, CPT-2, and CPT-3
  - 1. Acceptable Product: Refer to Color and Material Schedule on Drawings.
  - 2. Glue-down installation.

**2.3 ACCESSORIES**

- A. Reducer and Transition Strips: Refer to Section 096500.
- B. Patching compound:
  - 1. Pre-mixed latex recommended by carpet manufacturer.
  - 2. Gypsum based products not allowed.
  - 3. Compatible with adhesive and curing and sealing compound on concrete.
- C. Adhesives:
  - 1. General: Water based adhesive approved by carpet manufacturer.
  - 2. Antimicrobial: Manufacturer's standard.
  - 3. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that comply with VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
    - a. Current requirement refers to the date on which the materials are installed in the building.
    - b. SCAQMD Rule #1168 referenced in Section 018113 is current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
    - c. Interior refers to all building construction that is inside of the exterior weatherproofing material.
- D. Seam Adhesive: Hot-melt seaming adhesive and tape or similar product required by carpet manufacturer.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Bond and Moisture Tests:
  - 1. Perform in accordance with flooring manufacturer's requirements to determine suitability of concrete subfloor for receiving carpet flooring with regard to moisture content and curing compounds.
  - 2. Test concrete slabs in accordance with ASTM F710 to ensure moisture content is 3 percent or less.
  - 3. Test with calcium chloride in accordance with ASTM F1869 to ensure vapor transmission rate less than 4 pounds per 1000 sq. ft.
  - 4. Submit report to Owner. If subfloor's moisture vapor permeance is in excess of flooring manufacturer's limits for issuing warranty, prepare slab and apply vapor retarder underlayment system acceptable to manufacturer, or use manufacturer's adhesive for application on substrates containing excessive moisture.
- C. Do not begin flooring work until concrete substrate has cured for minimum of 90 days.

**3.2 PREPARATION**

- A. Remove ridges and bumps. Fill depressions, low spots, cracks, joints, holes, indentations, and other defects with leveling and patching compounds.
- B. Clean substrate to remove paint, dirt, oil, grease, sealers, release agents, hardening compounds, curing compounds, residual adhesives, and substances which could impair performance of adhesive materials.
- C. Broom clean and vacuum surfaces to remove dust and debris.

**3.3 INSTALLATION****A. General:**

1. Install in accordance with CRI-104, Section 017300, and approved shop drawings.
2. Install carpet square and aligned with adjacent surfaces.
3. Layout carpet rolls and verify carpet match before cutting.
4. Double cut carpet, to allow intended seam and pattern match. Make cuts straight, true and unfrayed.
5. Lay carpet with run or pile in same direction as anticipated traffic.
6. Lay carpet tight and flat with uniform appearance.
7. Do not change run of pile where carpet is continuous through wall opening from one room into another room.
8. Cut and fit carpet around interruptions and penetrations.
9. Seam Location:
  - a. Locate seams in area of least traffic.
  - b. Lay length seams in same direction within each space.
  - c. Center seams directly under doors.
  - d. At corridor change of direction, make seam follow wall line parallel to carpet direction.
10. Seam Joining:
  - a. Tape seams and press by hand to produce even pile.
  - b. Form seams straight, not overlapped or peaked, and free of gaps.
  - c. Seam joints tight and flush.
11. Apply seam adhesive and press by hand to produce even pile.
12. Install edge strip where carpet terminates at other floor coverings.

**B. Direct Glue Down:**

1. Apply carpet adhesive to substrate in accordance with adhesive manufacturer's instructions.
2. Lay carpet firmly in place. Trim perimeter edges of carpet.
3. Roll area lightly to eliminate air pockets and ensure uniform bond.

**3.4 CLEANING**

- A. Clean as required by manufacturer. Do not use materials or methods which may damage finish or surrounding construction.
- B. Vacuum carpet using commercial machine with face-beater element.
- C. Remove spots in accordance with manufacturer's instructions. Replace entire carpet where spots cannot be removed.

**3.5 PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. Comply with CRI 104, Section 15: "Protection of Indoor Installation."
- C. Maintain protection satisfactory to manufacturer and installer to ensure carpet not damaged at time of Substantial Completion.

**END OF SECTION**

**SECTION 099000**  
**PAINTING AND COATING**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Preparation and priming of surfaces scheduled at end of this Section to receive finish coatings.
  - 2. Painting and finish coating of exterior and interior items and surfaces, including:
    - a. Exposed interior surfaces.
    - b. Scheduled and otherwise identified exterior surfaces.
  - 3. Exterior and interior items and surfaces not requiring painting, unless noted otherwise:
    - a. Surfaces coated by other specification sections.
    - b. Items with factory applied finishes.
    - c. Aluminum, stainless steel, brass, bronze, chromium plate, copper, and nickel.
    - d. Brick, stone, ceramic tile, plastic laminate, and precast concrete.
    - e. Moving parts of operating units.
    - f. Code required labels or equipment identification plates.
    - g. Acoustical ceilings.
  - 4. Field finish coating of shop or factory primed items. Refer to individual Sections for priming requirements.
  - 5. Finish coatings schedule.
  - 6. Preparation work and coatings specified in this Section are in addition to shop and factory applied finishes and surface treatment specified in other Sections.
  - 7. Refer to Divisions 21, 22, 23, and 26 for painting requirements for items in dedicated mechanical and electrical spaces.
  - 8. Paint all other items unless specifically indicated not to be painted.
- B. Related Sections:
  - 1. Division 21 – Fire Suppression: Piping identification.
  - 2. Division 22 – Plumbing: Piping identification.
  - 3. Division 23 – Heating, Ventilating, and Air Conditioning: Mechanical identification.
  - 4. Division 26 – Electrical: Electrical identification.
- C. This Project is a registered US Green Building Council “LEED” project.
  - 1. Paints and Coatings must meet or exceed the VOC and chemical component limits of Green Seal requirements.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 DEFINITIONS**

- A. Conform to PDCA Glossary for interpretation of terms used in this Section except as modified below.
- B. Exposed Surfaces: Surfaces of products, assemblies, and components visible from any angle after final installation. Includes internal surfaces visible when operable doors, panels or drawers are open, and surfaces visible behind registers, grilles, or louvers.
- C. Concealed Surfaces: Surfaces permanently hidden from view in finished construction and which are only visible after removal or disassembly of part or all of product or assembly.
- D. Inaccessible Spaces: Spaces not intended for human use.
- E. Spaces listed below are defined as "Concealed" or "Inaccessible":
  - 1. Space between suspended ceilings and floor or roof construction above.
  - 2. Inside furred spaces.
  - 3. Inside of partitions.
  - 4. Mechanical and electrical items enclosed within casework or equipment.
  - 5. Foundation spaces.
  - 6. Crawl spaces.

7. Trenches and manholes.
  8. Mechanical shafts or chases.
  9. Enclosed elevator shafts [unless visible through glass panels].
  10. Utility tunnels.
- F. Sheen: Degree of luster as measured with specular gloss meter in accordance with ASTM D523:
- |             |                 |          |
|-------------|-----------------|----------|
| Flat:       | 85 degree meter | Below 15 |
| Eggshell:   | 60 degree meter | 5 to 20  |
| Satin:      | 60 degree meter | 15 to 35 |
| Semi-gloss: | 60 degree meter | 30 to 65 |
| Gloss:      | 60 degree meter | 65 to 80 |
| High Gloss: | 60 degree meter | Over 80  |
- G. Industrial Maintenance Primers and Topcoats: High performance coatings formulated for and applied to substrates in industrial, commercial, or institutional situations for purpose resisting heavy abrasion, immersion, prolonged exposure to temperatures in excess of 250 degrees F, prolonged moisture condensation, chemical corrosion, solvent cleaning, or exterior exposure of metal structures.
- H. Metallic Pigmented Coatings: Coatings containing at least 0.4 pounds of metallic pigment per gallon of coating as applied.
- I. System DFT: Dry film thickness of entire coating system unless otherwise noted.

### 1.3 SYSTEM REQUIREMENTS

- A. Perform testing according to following methods:
1. Solids Content by Volume: ASTM D2832.
  2. Surface Burning Characteristics: ASTM E84.
- B. Volatile Organic Compound Content: EPA TM-24 (40 CFR 60, Appendix A) [ASTM D3960].
- C. Application Requirements: Apply scheduled coatings to exposed surfaces of items and spaces unless specifically indicated otherwise.
- D. Surfaces Not To Be Painted:
1. Architectural concrete.
  2. Clay and glass unit masonry, decorative concrete unit masonry, and stone.
  3. Aluminum and aluminum based alloys, copper and copper based alloys, lead and lead based alloys, nickel and nickel based alloys, stainless steel, plated architectural metals, and "weathering" metals.
  4. Decorative plastic and metal laminates, and synthetic countertops.
  5. Elastomeric membranes and flashings, roofing materials, and exterior sealants and caulking.
  6. Acoustic materials.
  7. Rubber, vinyl, or plastic seals and bumpers.
  8. Surfaces concealed or inaccessible in finished construction unless specifically required.
  9. Other surfaces specifically scheduled or indicated to remain unfinished or unpainted.
- E. Materials and Products Not To Be Painted:
1. Items with integral or factory-applied final finish unless indicated otherwise.
  2. Wire fencing and areaway grating.
  3. Trench drain grates, manhole covers, and curb inlets.
  4. Moving parts of operating equipment such as valve and damper operators, linkages, sensing devices, motor and fan shafts.
  5. UL, FM or other code-required labels, name plates, identification or performance rating labels.
  6. Sprinkler heads.
  7. Mechanical and electrical items within unfinished spaces unless noted otherwise.
- F. Interface with Adjacent Systems:
1. Review other Sections specifying prime coats to ensure compatibility of total coating system for various substrates.
  2. Upon request from other trades, furnish information on characteristics of finish materials proposed for use to ensure compatibility of various coatings.

3. Test compatibility of existing coatings, including shop applied primers and previously applied coatings, by applying specified special coating to small, inconspicuous area.
4. If specified coating lifts or blisters existing coating, apply barrier or tie coat as recommended by coating manufacturer.
5. If no compatible barrier or tie coat exists, remove existing coating completely and apply coating system as specified for new work.

#### **1.4 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  1. Submit product data, including label analysis for each product proposed for use.
  2. Specifically include percent solids-by-volume, volatile organic compound (VOC) content lb/gal, and lead content (percent of weight of dried film).
  3. Schedule:
    - a. List each material proposed for use, and cross-reference to specific coating system and substrate application.
    - b. Identify each material by manufacturer's catalog number, product name, and generic classification.
    - c. [Include typewritten list identifying coating systems and colors applied to each room, space, or item.]
- C. Color and Sheen Samples:
  1. Prepare 1 sample of each opaque finish coating specified in each color and sheen selected for appearance verification.
  2. Apply to 12 by 12 by 1/4 inch hardboard. Apply sufficient coating thickness to provide proper hiding and appearance.
  3. Label each sample to indicate material, color, and sheen.
- D. Coating System Samples:
  1. Prepare 1 sample of each transparent coating system scheduled on actual wood substrate proposed for use. Apply in each top coat color selected.
  2. Prepare 1 sample of each opaque coating system scheduled on actual substrate materials proposed for use. Apply in most common top coat color selected.
  3. Step back each coat and process at least one inch to show bare substrate and each coat and process in system build-up.
  4. Minimum sample size of 4 by 8 inches.
  5. Label each sample to indicate materials, color, sheen, DFT of each coat applied, and total system DFT.
- E. Submit following Informational Submittals:
  1. Certifications specified in Quality Assurance article.
  2. Qualification Data: Applicator's qualification data.
  3. Manufacturer's instructions.
- F. Closeout Submittals:
  1. Submit under provisions of Section 017700.
  2. Warranty: Submit specified warranty.
- G. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Paint
  2. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
    - a. Paint

3. LEED Credit EQc4.2: Provide paint VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
  - a. Interior Latex/Acrylic Based Paint

### **1.5 QUALITY ASSURANCE**

- A. Single Source Responsibility:
  1. Provide products of single manufacturer for use in each coating system.
  2. Do not mix products of different manufacturers without approval of Architect and manufacturers involved.
  3. Provide manufacturer recommended materials (base and tints) for deep tone colors.
- B. Applicator Qualifications: Company specializing in commercial painting and finishing with 3 years documented experience.
- C. Regulatory Requirements:
  1. Comply with CPSC 16 CFR 1303 and other applicable federal, state, and local regulations limiting lead content of coatings to be applied.
- D. Certifications: Submit certification from manufacturer that materials furnished for use on this Project meet or exceed specified requirements and comply with applicable federal, state, and local requirements regarding lead and VOC content.

### **1.6 FIELD SAMPLES**

- A. General: Comply with requirements of Section 014000.
- B. Sample Installation: Duplicate finishes of approved coating system samples on wall surfaces and other interior and exterior components selected by Architect.
- C. Provide full-coat finish on at least 100 sq ft of surface until required color, sheen, and texture are obtained. Simulate finished lighting conditions for review of in-place work.
- D. Request review by Architect of first finished room, space, or item for each coating system for color, texture, quality, and workmanship.

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

- A. Comply with requirements of Section 016000.
- B. Deliver products to site in manufacturer's sealed and labeled containers; inspect to verify compliance with specified requirements.
- C. Label containers to indicate manufacturer's name, product name and type of coating, brand code or stock number, date of manufacture, coverage, surface preparation, drying time, cleanup, color designation and instructions for mixing and reducing.
- D. Store coating materials in tightly covered containers in well ventilated area at ambient temperatures of 45 degrees F minimum and 90 degrees F maximum, unless required otherwise by manufacturer. Maintain containers in clean condition, free of foreign materials and residue with labels in legible condition.
- E. Take precautionary measures to prevent fire hazards and spontaneous combustion.

### **1.8 PROJECT CONDITIONS**

- A. Environmental Conditions: Comply with more restrictive of following or manufacturer's requirements under which systems can be applied.
  1. Provide continuous ventilation during application of coatings to exhaust hazardous fumes.
  2. Provide heating necessary to maintain surface and ambient temperatures within specified limits.
  3. Maintain temperature and humidity conditions for minimum 24 hours before, during, and 48 hours after application of finishes, unless longer times are required by manufacturer.
  4. Do not permit wide variations in ambient temperatures which might result in condensation on freshly coated surfaces.

5. Provide illumination of not less than 80 footcandles measured mid-height at substrate surface during application of coatings.
6. Apply water reducible coatings only when ambient and surface temperatures are between 50 degrees F and 90 degrees F.
7. Apply solvent reducible coatings only when ambient and surface temperatures are between 45 degrees F and 90 degrees F.
8. Do not apply coatings under any of following conditions:
  - a. When surfaces are damp or wet.
  - b. During snow, rain, fog, or mist.
  - c. When relative humidity is less than 20 percent or exceeds 85 percent.
  - d. When temperature is less than 5 degrees F above dew point.
  - e. When dust may be generated before coatings have dried.
  - f. In direct sunlight.
  - g. When wind velocity is above 20 mph.
9. Application of coatings may continue during inclement weather provided work areas and surfaces to be coated are enclosed and specified environmental conditions are maintained.

#### **1.9 WARRANTY**

- A. Comply with provisions of Section 017700.
- B. Warrant installation to be free from defects in material and workmanship for 5 years.
- C. Repair or replace defects occurring during warranty period.
- D. Defects include but are not limited to pinholes, crazing or cracking, loss of adhesion to substrate, deficient thickness, improper materials and workmanship.

#### **1.10 EXTRA STOCK MATERIAL**

- A. Furnish under provisions of Section 017700.
- B. Provide 1 unopened gallon container of each type of opaque top coating in each color and sheen used on Project.
- C. Store where directed with labels intact.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Paint colors have been pre-approved by the Owner. Alternate colors will not be accepted.

#### **2.2 COATING MATERIALS - GENERAL**

- A. Coatings:
  1. Ready-mixed, factory tinted, best professional grade produced by manufacturer.
  2. Use manufacturer's appropriate base materials to achieve required colors.
  3. Fully grind pigments to maintain soft paste consistency in vehicle.
  4. Capable of being dispersed into uniform, homogeneous mixture.
  5. Possess good flowing and brushing properties.
  6. Capable of drying or curing free of streaks or sags, and yielding specified finish.
  7. VOC content of field applied coatings shall comply with local governing authorities.
- B. Paint and Primer Maximum Product Emissions Limits: Top coat and primer interior paints must meet or not exceed the VOC (Volatile Organic Compounds) limits of the current requirements of Green Seal Standards GS-11 - Paints in the building. GS-11 VOC limits for interior paints are as follows. Interior refers to all building construction that is inside of the exterior weatherproofing material:
  1. Interior, Non-flats: 150 grams per liter of product minus water
  2. Interior, Flats: 50 grams per liter of product minus water

**2.3 FINISH COATINGS SCHEDULE****A. Exterior Coating Systems:****1. Concrete and Masonry Surfaces: GFRC****1) Latex Finish :**

Sheen: Eggshell.

Prime Coat: Alkali Resistant Primer at 1.5 mils.

Under Coat: Exterior Latex House Paint at 1.5 mils.

Top Coat: Exterior Latex House Paint at 1.5 mils.

System DFT: 3.0 mils.

**2. Metal Surfaces:****a. Non-Ferrous Metals and Zinc-Coated (Galvanized) Steel.****1) System No. EM-2 (Latex Finish):**

Sheen: Semi-Gloss.

Prime Coat: Universal Primer at 2.0 mils.

Under Coat: Industrial Acrylic at 3.0 mils.

Top Coat: Industrial Acrylic at 3.0 mils.

System DFT: 8.0 mils.

**b. Ferrous Metals - Uncoated:****1) System No. EM-4 (Latex Finish):**

Sheen: Semi-Gloss.

Prime Coat: Universal Primer at 2.0 mils.

Under Coat: Industrial Acrylic at 2.5 mils.

Top Coat: Industrial Acrylic at 2.5 mils.

System DFT: 7.5 mils.

**c. Ferrous Metals - Previously Coated:****1) Coating System No. EM-6 (Latex Finish):**

Sheen: Semi-Gloss.

Prime Coat: Touch-up existing with compatible primer.

Under Coat: Industrial Acrylic at 2.5 mils.

Top Coat: Industrial Acrylic at 2.5 mils.

System DFT: 5.0 mils (excluding existing and touch-up primer).

**3. PVC Surfaces:****a. PVC trimboards and sheets:****1) System No. EW-2 (Opaque Latex Paint Finish):**

Sheen: Eggshell.

Prime Coat: Factory primed.

Under Coat: Exterior Latex House Paint at 1.5 mils.

Top Coat: Exterior Latex House Paint at 1.5 mils.

System DFT: 5.2 mils.

**B. Interior Coating Systems:****1. Concrete and Masonry Surfaces:****a. Concrete Masonry Units:****1) Low VOC Finish:**

Sheen: Satin.

Prime Coat: Interior Block Filler at 11.0 mils.

Under Coat: Low-VOC interior latex/acrylic based paint at 1.4 mils.

Top Coat: Low-VOC interior latex/acrylic based paint at 1.4 mils.

System DFT: 2.8 mils not including block filler.

**2. Metal Surfaces:****a. Non-Ferrous Metals and Zinc-Coated (Galvanized) Steel:****1) Low VOC Finish:**

Sheen: Semi-Gloss.

Prime Coat: Universal Primer at 2.0 mils.

Under Coat: Low-VOC interior latex/acrylic based paint at 1.4 mils.

Top Coat: Low-VOC interior latex/acrylic based paint at 1.4 mils.

System DFT: 4.8 mils.



- b. Ferrous Metals - Uncoated:
  - 1) Low VOC Finish:
    - Sheen: Semi-Gloss.
    - Prime Coat: Universal Primer at 2.0 mils.
    - Under Coat: Low-VOC interior latex/acrylic based paint at 1.4 mils.
    - Top Coat: Low-VOC interior latex/acrylic based paint at 1.4 mils.
    - System DFT: 5.8 mils minimum.
- c. Ferrous Metals - Previously Coated, including with intumescent fireproofing:
  - 1) Low VOC Finish:
    - Sheen: Semi-Gloss.
    - Prime Coat: Touch-up existing with compatible primer.
    - Under Coat: Low-VOC interior latex/acrylic based paint at 1.4 mils.
    - Top Coat: Low-VOC interior latex/acrylic based paint at 1.4 mils.
    - System DFT: 2.8 mils (excluding existing and touch-up primer).
- 3. Gypsum Surfaces:
  - a. Gypsum Board Walls and Ceilings and Plaster Ceilings:
    - 1) Low VOC, Latex/Acrylic Finish:
      - Sheen: Flat at Ceilings; Eggshell at Walls; Semi-Gloss at Shower Ceilings.
      - Prime Coat: Manufacturers standard Low VOC Primer at 1.0 mils.
      - Under Coat: Low-VOC interior latex/acrylic based paint at 1.4 mils.
      - Top Coat: Low-VOC interior latex/acrylic based paint at 1.4 mils.
      - System DFT: 3.8 mils.

## 2.4 FILLERS AND SEALERS

- A. Interior Block Filler:
  - 1. Behr: Behr Pro-Block Filler P50
  - 2. Benjamin Moore and Company: Latex Block Filler (160).
  - 3. PPG: Speedhide Interior/Exterior Latex Block Filler 6-7
  - 4. Sherwin-Williams: Block Filler (B25W25).

## 2.5 PRIME COATINGS

- A. Exterior Alkali Resistant Primer:
  - 1. Behr Paints: Premium Multi Surface Primer (436)
  - 2. Benjamin Moore: Regal Select Primer (546)
  - 3. PPG: Perma-Crete Alkali-Resistant Primer 4-603
  - 4. Sherwin-Williams: Loxon Masonry Primer (A24W8300)
- B. Etching Metal Primer:
  - 1. Behr: Krud Kutter Metal Clean and Etch
  - 2. Benjamin Moore: Cleaner / Etch (P83)
  - 3. Sherwin-Williams: DTM Wash Primer (B71Y1).
- C. Low VOC Premium Latex Primer:
  - 1. Behr: Premium Plus Drywall Primer Sealer (73)
  - 2. Benjamin Moore and Company: Natura Primer (511).
  - 3. PPG: Pure Performance Interior Latex Primer 9-900
  - 4. Sherwin-Williams: Harmony Primer (B11W900)
- D. Universal Metal Primer:
  - 1. Behr: Premium Multi-Surface Primer (436)
  - 2. Benjamin Moore: Acrylic Metal Primer (M04)
  - 3. PPG: Pitt Tech Plus DTM Acrylic Primer 90-912 premium or Pitt Tech Primer Finish DTM Primer Finish 90-712 professional
  - 4. Sherwin-Williams: Pro-Industrial Pro-Cryl Universal Acrylic Primer (B66-310).

**2.6 WATER REDUCIBLE COATINGS**

- A. Exterior Premium Acrylic Latex House Paint:
  - 1. Behr:
    - a. Flat: Premium Plus Exterior Flat (4050)
    - b. Satin: Premium Plus Exterior Satin (9050)
    - c. Semi-Gloss: Premium Plus Exterior Semi-Gloss (5050)
  - 2. Benjamin Moore and Company:
    - a. Flat: Regal Select Flat (400)
    - b. Satin: Regal Select Low Luster (401)
    - c. Semi-Gloss: Regal Select Soft Gloss (402)
    - d. Gloss: NA
  - 3. PPG
    - a. Flat: Manor Hall Flat 70-101
    - b. Satin: Manor Hall Timeless Satin 70-410
    - c. Eggshell: Manor Hall Egg Shell 70-301
    - d. Semi-Gloss: Manor Hall Semi-Gloss 70-501
    - e. Gloss: Manor Hall Gloss 52-110
  - 4. Sherwin-Williams:
    - a. Flat: Duration Flat (K32).
    - b. Satin: Duration (K33).
    - c. Semi-Gloss: Metalatex SG (B42)
    - d. Gloss: Duration (K34)
- B. Industrial 100% Acrylic:
  - 1. Behr:
    - a. Semi-Gloss: Behr Pro e600 Exterior Semi-Gloss 670
  - 2. Benjamin Moore:
    - a. Semi-Gloss: Regal Select Soft Gloss (402)
    - b. Gloss: NA
  - 3. PPG
    - a. Satin: Pitt- Tech Satin DTM 90-1110 premium
    - b. Semi-Gloss: .Pitt Tech Plus DTM Acrylic Semi-Gloss 90-1210
    - c. Gloss: Pitt Tech Plus DTM Acrylic DTM Gloss 90-1310 premium
  - 4. Sherwin-Williams:
    - a. Semi-Gloss: Metalatex SG (B42)
    - b. Gloss: Duration Gloss (K34). SOLO 100% Acrylic Int/Ext Gloss, A77W00051
  - 5. Tnemec Company, Inc.: Tneme-Cryl Series 6 (Flat) and Series 7 (Semi-gloss).
- C. Low-VOC Interior Latex/Acrylic Based Paint:
  - 1. Behr:
    - a. Flat: Premium Plus Interior Flat 1050
    - b. Eggshell: Premium Plus Interior Eggshell 2050
    - c. Semi-Gloss: Premium Plus Interior Semi-Gloss 3050
  - 2. Benjamin Moore and Company:
    - a. Flat, Natura Flat (512)
    - b. Eggshell, Natura Eggshell (513)
    - c. Semi-Gloss, Natura Semi-Gloss (514)
  - 3. PPG:
    - a. Flat: Pure Performance zero interior Flat 9-100
    - b. Eggshell: Pure Performance zero Interior Eggshell 9-300
    - c. Semi-Gloss: Pure Performance zero Interior Semi-Gloss 9-500
  - 4. Sherwin-Williams:
    - a. Flat: Harmony Flat (B5-1000).
    - b. Eggshell: Harmony Eggshell (B9-1000)
    - c. Semi-Gloss: Harmony Semi-Gloss (B10-1000).

**2.7 ACCESSORY MATERIALS**

- A. Muriatic acid, mildewcide, TSP (tri-sodium phosphate), acidic-detergent, zinc sulfate, sodium metasilicate, and solvent: Commercially available, non-damaging to surface being cleaned; as specified in PDCA Specification Manual; acceptable to coating manufacturer.
- B. Metal Conditioner: Proprietary phosphoric acid based, etching type solution; acceptable to coating manufacturer.
- C. Rust Inhibitor: Water containing 0.32 percent of sodium nitrite and 1.28 percent by weight of secondary ammonium phosphate (dibasic); or water containing 0.2 percent by weight of chromic acid or sodium chromate or sodium dichromate or potassium dichromate.
- D. Spackling compound, putty, plastic wood filler, liquid de-glosser, latex patching plaster, latex base filler, thinners, and other materials not specifically indicated but required to achieve finishes specified: Pure, of highest commercial quality, compatible with coatings and acceptable to coating manufacturer.
- E. Do not use products of different manufacturers in combination.

**2.8 MIXING**

- A. Use factory prepared colors matching approved samples. Site tinting will not be permitted.
- B. Thoroughly mix and stir coatings before use to ensure homogeneous dispersion of ingredients. Prior to application, blend multiple containers of same material and color by pouring from one container to another several times to ensure uniform consistency, color, and smoothness.
- C. Mix only in clean mixing pails of material recommended by manufacturer to avoid contamination.
- D. Remove film which may form on surface of material in containers and strain material before using. Stir frequently during use to maintain pigments in suspension. Do not stir film into material.
- E. Apply coatings of consistency recommended by manufacturer. Thin only within recommended limits using thinners approved by coating manufacturer.

**2.9 COLORS AND FINISHES**

- A. Colors: Refer to Materials Legend.
- B. Sheen:
  - 1. Ceilings: Flat elsewhere unless noted otherwise.
  - 2. Walls: Satin/Eggshell elsewhere unless noted otherwise.
  - 3. Metal Doors and Frames: Semi-gloss, unless noted otherwise.
  - 4. Metals with accent colors – Semi-gloss, unless noted otherwise.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Measure moisture content of substrates using recently calibrated electronic moisture meter. Do not apply coatings if moisture content of surfaces exceeds lesser of percentages listed below or those required by coating manufacturer. If excess moisture content exists and cannot be reduced, obtain written approval of coating manufacturer before application of coatings.
  - 1. Gypsum board and gypsum plaster: 17 percent.
  - 2. Architectural woodwork, trim, cabinets, and casework: 10 percent; measure with resistance-type meter in accordance with ASTM D4442.
  - 3. Common board and dimension lumber: 12 percent; measure with resistance-type meter in accordance with ASTM D4442.
  - 4. Masonry, concrete, CMU, and Portland cement plaster: 17 percent for solvent reduced coatings. Test concrete floors in accordance with ASTM D4263.
  - 5. Canvas and cotton insulation coverings: 12 percent max.
- C. Prior to applying alkali and acid sensitive coatings, test surface pH with universal pH paper placed against wetted surface. Substrate pH shall not exceed pH of clean wash water.
- D. Beginning of execution constitutes acceptance of existing conditions.

**3.2 PREPARATION - GENERAL**

- A. Protect completed construction from damage. Furnish drop cloths, shields, and protective methods to prevent spray, splatter, or droppings from disfiguring other surfaces.
- B. Remove surface hardware, mechanical diffusers, escutcheons, registers, electrical plates, light fixture trim, fittings, fastenings and similar items prior to preparing surfaces for finishing. Provide surface-applied protective masking for non-removable items. Carefully store removed items for reinstallation.
- C. Remove mildew by scrubbing with mildewcide. Rinse thoroughly with clean water.
- D. Before beginning application of coatings, ensure surfaces are clean, dry, and free of dirt, dust, rust or rust scale, oil, grease, mold, mildew, algae, efflorescence, release agents, or any other foreign material which could adversely affect coating adhesion or finished appearance.

**3.3 SURFACE PREPARATION FOR NEW WORK**

- A. General:
  - 1. Correct minor defects.
  - 2. Remove temporary labels, wrappings, and protective coverings from surfaces to be coated.
  - 3. Seal stains, marks, and other imperfections which may bleed through surface finishes.
- B. Aluminum:
  - 1. Clean in accordance with SSPC SP1 "Solvent Cleaning".
  - 2. Apply etching type primer.
- C. Concrete:
  - 1. Prior to application of coatings, allow surfaces to cure minimum 60 days.
  - 2. Remove dirt, scale, powder, laitance, and bond breakers by light sandblasting to minimum 1.5 mil profile.
  - 3. Remove oil and grease with solution of TSP; rinse well.
  - 4. Remove stains caused by weathering or corroding metals with solution of sodium metasilicate applied after thoroughly wetting surface with potable water; allow to dry.
  - 5. Fill cracks and voids with compatible filler.
- D. Gypsum Board:
  - 1. Refer to Section 092900 for general surface preparation.
  - 2. Fill remaining cracks, depressions, holes and other irregularities with spackling compound.
  - 3. Sand rough or high spots left by joint cement or spackling compound without damaging paper face.
  - 4. Remove dust by wiping with damp cloths or vacuuming.
- E. Masonry:
  - 1. Prior to application of coatings, allow surfaces to cure minimum 28 days.
  - 2. Remove dirt, scale, loose mortar, efflorescence, and powder by wire brushing or by other approved methods.
  - 3. Remove oil and grease with solution of TSP, rinse, and allow to dry.
  - 4. Remove stains caused by weathering or corroding metals with solution of sodium metasilicate applied after thoroughly wetting surface with potable water; allow to dry.
  - 5. Wash and neutralize surfaces as recommended by coating manufacturer, rinse, and allow to dry.
- F. Steel - Uncoated:
  - 1. Remove weld spatter by chipping or grinding.
  - 2. Clean interior and weather protected steel in accordance with SSPC SP2 "Hand Tool Cleaning" and SP3 "Power Tool Cleaning". Clean areas of excessive corrosion or scale in accordance with SSPC SP7 "Brush-Off Blast Cleaning".
  - 3. Clean exterior steel permanently exposed to elements in accordance with SSPC SP6 "Commercial Blast Cleaning".
  - 4. Apply metal conditioner to bare surfaces in accordance with manufacturer's recommendations, paying particular attention to abrasions, welds, bolts, and nuts. Allow to set as recommended by solution manufacturer. Rinse with clean water with rust inhibitor mixed with water or applied immediately following rinse. Allow to dry.

5. Prime coat immediately.
- G. Steel - Prime Coated:
  1. Remove loose primer and rust to feather-edge at adjacent sound primer by cleaning in accordance with SSPC SP2 "Hand Tool Cleaning" and SP3 "Power Tool Cleaning".
  2. Apply metal conditioner to abrasions, welds, bolts, and nuts in accordance with manufacturer's recommendations. Allow to set as recommended by manufacturer. Rinse with clean water with rust inhibitor mixed with water or applied immediately following rinse. Allow to dry.
  3. Prime coat bare areas immediately.
- H. Galvanized Steel: Remove soluble and insoluble contaminants and corrosion. Sweep (Abrasive) Blasting per ASTM D6386 to achieve a uniform anchor profile (1.0 - 2.0 mils).

### 3.4 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 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, request recommendation from Architect.
  7. Apply specified primer to surfaces scheduled to receive coatings.
- B. Concrete Masonry Units:
  1. Fill cracks and voids with latex base filler.
  2. Apply masonry conditioner to masonry surfaces in accordance with manufacturer's instructions.
  3. Apply primer over bare surfaces and filler material.
- C. Gypsum Wallboard and Gypsum Plaster:
  1. Fill cracks and voids with spackling compound.
  2. Apply primer over bare surfaces and newly applied texture coatings.
- D. Metal:
  1. Remove rust from surfaces to bare metal in accordance with SSPC SP6 "Commercial Blast Cleaning".
  2. Exercise care not to remove galvanizing.
  3. Complete preparation as specified for new work.

### 3.5 APPLICATION

- A. General Requirements:
  1. Coat all surfaces specified, scheduled, illustrated, and otherwise exposed unless specifically noted otherwise.
  2. Apply coatings of type, color, and sheen as scheduled [selected].
  3. Apply products in accordance with Section 017300. Use application materials, equipment, and techniques as recommended by coating manufacturer and best suited for substrate and type of material being applied.
  4. Do not apply finishes to surfaces that are improperly prepared.
  5. Number of coats specified are minimum number acceptable.
  6. Apply coating systems to total dry film thickness scheduled. Apply material at not less than manufacturer's recommended spreading rate. Do not exceed maximum single coat thickness recommended by coating manufacturer. Do not double-back with spray equipment building up film thickness of two coats in one pass.
  7. Ensure that edges, corners, crevices, welds, and exposed fasteners receive dry film thickness equivalent of flat surfaces.

8. Finish edges of coatings adjoining other materials or colors sharp and clean, without overlapping.
- B. Prime Coats:
  1. Apply initial coat to surfaces as soon as practical after preparation and before subsequent surface deterioration.
  2. Backprime exterior woodwork with specified primer.
  3. Backprime interior woodwork scheduled to receive transparent finish with gloss varnish reduced 25 percent with mineral spirits.
  4. Apply primer to wood and metal sash before field glazing.
- C. Intermediate and Top Coats:
  1. Allow previously applied coat to dry before next coat is applied.
  2. Sand and dust lightly between coats as recommended by coating manufacturer.
  3. Apply each coat to achieve uniform finish, color, appearance, and coverage free of brush and roller marks, runs, misses, visible laps or shadows, hazing, bubbles, pin holes, or other defects.
  4. If stains, undercoats, or other conditions show through final topcoat, correct defects and apply additional topcoats until coating film is of uniform finish, color, and appearance.
- D. Finish Matching:
  1. Finish closets same as adjoining rooms, unless otherwise specified.
  2. Finish tops, bottoms, and edges of doors same as door faces. Apply sanding sealer to cut-outs. When faces are different colors, finish edges of doors to match space from which they are visible when door is in partly open position.
  3. Finish other surfaces not specifically mentioned to match adjoining surfaces.
- E. Mechanical and Electrical Items:
  1. Refer to Division 21 – Fire Suppression, Division 22 – Plumbing, Division 23 - Heating, Ventilating, and Air Conditioning, and Division 26 - Electrical for schedule of color coding and identification banding of equipment, ductwork, piping, and conduit. Color code equipment, piping, conduit and exposed ductwork in accordance with requirements indicated.
  2. Prior to finishing mechanical and electrical items, remove louvers, grilles, covers, and access panels and finish separately. Replace when dry.
  3. Paint interior surfaces of ducts, and heating cabinets that are visible or reflective behind grilles and registers with one coat of flat black paint.
  4. Finish dampers visible behind grilles and registers to match surface finish.
  5. Paint both sides and edges of plywood equipment backboards before installing equipment.
  6. Do not apply coatings over name plates, tags, or other equipment identification.
- F. Reinstall trim, fittings, and other items removed for finishing.

### **3.6 FIELD QUALITY CONTROL**

- A. General: Comply with requirements of Section 014000.
- B. Periodically test film thickness of each coat with wet film gage to ensure coatings are being applied to proper thickness.
- C. Request review of each applied coat by Architect before application of successive coats. Only reviewed coats will be considered in determining number of coats applied.
- D. Immediately prior to Substantial Completion, perform detailed inspection of painted surfaces and repair or refinish abraded, stained, or otherwise disfigured surfaces.

### **3.7 CLEANING**

- A. Promptly remove spilled, splashed, or spattered coatings. Clean spots, oil, and other soiling from finished surfaces using cleaning agents and methods which will not damage materials.
- B. If completed construction is damaged beyond normal cleaning or repair by painting operations, replace damaged items at no additional cost to Owner.
- C. Maintain premises and storage areas free of unnecessary accumulation of tools, equipment, surplus materials, and debris.

- D. Collect waste, cloths, and material which may constitute fire hazards and place in closed metal containers; remove from site daily along with empty containers.

**3.8 PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. Protect work of other trades against damage from coating activities. Correct damage by cleaning, repairing, replacing, and recoating as acceptable to Architect.
- C. Provide "Wet Paint" signs and other methods to protect newly coated surfaces. Remove when directed or when no longer needed.

**END OF SECTION**





**SECTION 099600**  
**HIGH PERFORMANCE COATINGS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Interior Coatings for:
    - a. CMU walls.
    - b. Exposed overhead ceilings.
- B. Related Sections:
  - 1. Section 092900 - Gypsum Board.
- C. This Project is a registered US Green Building Council "LEED" project.
  - 1. Paints and Coatings must meet or exceed the VOC and chemical component limits of Green Seal and SCAQMD VOC Rule 1113 requirements.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 DEFINITIONS**

- A. DFT: Dry film thickness.
- B. Conform to PDCA Glossary for interpretation of terms used in this Section except as modified below.
  - 1. Exposed Surfaces: Surfaces of products, assemblies, and components visible after final installation. Includes internal surfaces visible when operable doors, panels or drawers are open, and surfaces visible behind registers, grilles, or louvers.
  - 2. Concealed Surfaces: Surfaces permanently hidden from view in finished construction and which are only visible after removal or disassembly of part or entire product or assembly.
  - 3. Inaccessible Spaces: Spaces not intended for human use.
  - 4. Spaces listed below are defined as "Concealed" and "Inaccessible":
    - a. Space between suspended ceilings and floor and roof construction above.
    - b. Inside furred spaces.
    - c. Inside of partitions.
    - d. Mechanical and electrical items enclosed within casework and equipment.
    - e. Foundation spaces.
    - f. Crawl spaces.
    - g. Trenches and manholes.
    - h. Mechanical shafts or chases.
    - i. Enclosed elevator shafts.
    - j. Utility tunnels.
- C. Sheen: Degree of luster as measured with specular gloss meter in accordance with ASTM D523:

1. Flat:	85 degree meter	Below 15
2. Eggshell:	60 degree meter	5 to 20
3. Satin:	60 degree meter	15 to 35
4. Semi-gloss:	60 degree meter	30 to 65
5. Gloss:	60 degree meter	65 to 80
6. High Gloss:	60 degree meter	Over 80

**1.3 SYSTEM REQUIREMENTS**

- A. Testing Requirements: Test according to following methods.
  - 1. Abrasion: ASTM D4060.
  - 2. Adhesion: ASTM D3359, D4541.
  - 3. Humidity: ASTM D4585.
  - 4. Salt Spray (Fog): ASTM B117.
  - 5. Solids Content by Volume: ASTM D2832.
  - 6. Surface Burning Characteristics: ASTM E84.

7. Volatile Organic Compound Content: EPA TM-24 (40 CFR 60, Appendix A) [ASTM D3960].
- B. Application Requirements: Apply scheduled coatings to exposed surfaces of items scheduled and otherwise indicated unless specifically noted otherwise.
- C. Interface with Adjacent Systems:
  1. Review other Sections specifying prime coats to ensure compatibility of total coating system for various substrates.
  2. Upon request from other trades, furnish information on characteristics of finish materials proposed for use to ensure compatibility of various coatings.
  3. Test compatibility of existing coatings, including shop applied primers and previously applied coatings, by applying specified coating to small, inconspicuous area.
  4. If coating lifts or blisters existing coating, apply barrier or tie coat as instructed by coating manufacturer.
  5. If no compatible barrier or tie coat exists, remove existing coating completely and apply coating system as specified for new work.

#### 1.4 SUBMITTALS

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  1. Submit product data including label analysis for each product proposed for use.
  2. Specifically include percent solids-by-volume, volatile organic compound (VOC) content g/L, and lead content (percent of weight of dried film).
  3. Schedule:
    - a. List each material proposed for use. Cross-reference to specific coating system and substrate application.
    - b. Identify each material by manufacturer's catalog number, product name, and generic classification.
- C. Coating System Samples:
  1. Prepare 1 sample of each coating system scheduled on actual substrate materials proposed for use.
  2. Provide sample for each top coat color scheduled.
  3. Step back each coat at least one inch to show bare substrate and each coat in system build-up.
  4. Minimum sample size of 4 by 8 inches.
  5. Label each sample to indicate materials, color, sheen, DFT of each coat applied, and total system DFT.
- D. Submit following Informational Submittals:
  1. Test Reports: Indicate compliance with specified performance requirements.
  2. Certifications specified in Quality Assurance article.
  3. Qualification Data: Manufacturer's and applicator's qualification data.
  4. Manufacturer's Instructions: Include mixing, thinning, and curing requirements; application temperature ranges; and required surface preparation.
- E. Closeout Submittals:
  1. Submit under provisions of Section 017700.
  2. Warranty: Submit specified warranty.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Coatings
  2. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
    - a. Coatings

3. LEED Credit EQc4.2: Provide paint VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
  - a. Interior Coatings

#### **1.5 QUALITY ASSURANCE**

- A. Single Source Responsibility: Provide products of single manufacturer for use in each coating system. Do not mix products of different manufacturers without approval of Architect and manufacturers involved.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this Section with minimum 5 years documented experience.
- C. Applicator Qualifications: Company specializing in application of coatings scheduled with 3 years documented experience; licensed or approved by coating manufacturer.
- D. Regulatory Requirements:
  1. Comply with CPSC 16 CFR 1303 and other applicable federal, state, and local regulations limiting lead content of coatings to be applied.
- E. Certifications:
  1. Submit certification from manufacturer that materials furnished for use on this Project meet or exceed specified requirements and comply with applicable federal, state, and local requirements regarding lead and VOC content.

#### **1.6 FIELD SAMPLES**

- A. General: Comply with requirements of Section 014000.
- B. Sample Installation: Duplicate finishes of approved coating system samples on surfaces selected by Architect.
- C. Provide full-coat finish on at least 100 square feet of surface until required color, sheen, and texture are obtained. Simulate finished lighting conditions for review of in-place work.
- D. Request review by Architect of first finished room, space, or item for each coating system for color, texture, quality, and workmanship.

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

- A. Conduct pre-installation conference in accordance with Section 013100.
- B. Schedule meeting prior to purchasing materials for field samples.
- C. Agenda: Include items to be coated, preparation procedures, and methods of application.

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

- A. Comply with requirements of Section 016000.
- B. Deliver products to site in manufacturer's sealed and labeled containers; inspect to verify compliance with specified requirements.
- C. Label containers to indicate manufacturer's name, product name and type of coating, brand code or stock number, date of manufacture, coverage, surface preparation, drying time, cleanup, color designation, and instructions for mixing and reducing.
- D. Store coating materials in tightly covered containers in well ventilated area at ambient temperatures of 45 degrees F minimum and 90 degrees F maximum, unless required otherwise by manufacturer. Maintain containers in clean condition, free of harmful materials and residue with labels in legible condition.
- E. Take precautionary measures to prevent fire hazards and spontaneous combustion.

#### **1.9 PROJECT CONDITIONS**

- A. Environmental Conditions: Comply with more restrictive conditions under which coatings may be applied; following requirements or manufacturer's requirements.
  1. Provide continuous ventilation during application of coatings to exhaust hazardous fumes.

2. Provide heating necessary to maintain surface and ambient temperatures within specified limits.
3. Maintain temperature and humidity conditions for minimum 24 hours before, during, and 48 hours after application of finishes.
4. Do not permit wide variations in ambient temperatures which might result in condensation on freshly coated surfaces.
5. Provide illumination of not less than 80 footcandles measured mid-height at substrate surface during application of coatings.
6. Apply coatings only when ambient and surface temperatures are between 55 degrees F and 90 degrees F.
7. Do not apply coatings under following conditions:
  - a. When surfaces are damp and wet.
  - b. During snow, rain, fog, and mist.
  - c. When relative humidity is less than 20 percent or exceeds 85 percent.
  - d. When temperature is less than 5 degrees F above dew point.
  - e. When dust may be generated before coatings have dried.
  - f. In direct sunlight.
  - g. When wind velocity is above 20 mph.
8. Application of coatings may continue during inclement weather provided work areas and surfaces to be coated are enclosed and specified environmental conditions are maintained.

#### **1.10 WARRANTY**

- A. Comply with provisions of Section 017700.
- B. Warrant against defects in material and workmanship for 5 years.
- C. Repair or replace defects occurring during warranty period.
- D. Defects include but are not limited to holidays, wrinkling, pinholes, crazing and cracking, loss of adhesion to substrate, deficient thickness, improper materials and workmanship.

### **PART 2 - PRODUCTS**

#### **2.1 MANUFACTURERS**

- A. Acceptable Manufacturers:
  1. Carboline Comany, Saint Louis, MO.
  2. Tnemec Company, Inc., Kansas City, MO.
  3. Dupont, Wilmington, DE.

#### **2.2 COATING MATERIALS - GENERAL**

- A. Coatings:
  1. Furnish coatings with uniform, homogeneous mixture.
  2. Provide cured coating free of streaks and sags, and yielding specified finish.
  3. Chemical Components of Interior Paints and Coatings: Provide products that comply with Green Seal's GS-11, including following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and following chemical restrictions:
    - a. Flat Paints and Coatings: VOC content of not more than 50 g/L.
    - b. Nonflat Paints and Coatings: VOC content of not more than 150 g/L.
    - c. Aromatic Compounds: Paints and coatings shall not contain more than 1.0 percent by weight of total aromatic compounds (hydrocarbon compounds containing 1 or more benzene rings).
- B. Coating and Primer Maximum Product Emissions Limits: Top coat and primer interior paints must meet or not exceed the VOC (Volatile Organic Compounds) limits of the current requirements of Green Seal Standards GS-11 - Paints in the building. GS-11 VOC limits for interior paints are as follows. Interior refers to all building construction that is inside of the exterior weatherproofing material:
  1. Interior, Non-flats: 150 grams per liter of product minus water
  2. Interior, Flats: 50 grams per liter of product minus water

**2.3 MASONRY AND CONCRETE FILLERS**

- A. Type F1 - Masonry Fillers:
  - 1. Acceptable Manufacturers and Products:
    - a. Tnemec Company, Inc.: 130 Envirofill.
    - b. Carboline Company: Sanitile 100.
    - c. Dupont: Corlar 2.1-PR.
  - 2. Physical Requirements:
    - a. Solids Content by Volume: 65 percent minimum.
  - 3. Performance Requirements:
    - a. General: Tests are based on one coat at manufacturer's recommended DFT.
    - b. Adhesion: ASTM D3359, not less than rating of 5.
    - c. Moisture Resistance: TT-C-555B, no cracking, blistering and visible damage to substrate and coating, no visible dampness on backside of test specimen after 24 hour exposure.

**2.4 EPOXY COATINGS**

- A. Type E1 - Flat/Satin Catalyzed Epoxy Coatings:
  - 1. Acceptable Manufacturers and Products:
    - a. Tnemec Company, Inc.: Series L69 Epoxoline II.
    - b. Carboline Company: Carboguard 890 VOC.
    - c. Dupont: Corlar LV-PR.
  - 2. Physical Requirements:
    - a. Solids Content by Volume: 65 percent minimum.
    - b. V.O.C.: 98 g/L.
  - 3. Self-priming over galvanized surfaces.
  - 4. Performance Requirements:
    - a. General: Tests are based on 2 coats at manufacturer's recommended DFT.
    - b. Abrasion: ASTM D4060, CS17 wheel with 1000 g load, maximum 150 mg loss after 1000 cycles.
    - c. Adhesion: ASTM D4541 Type II Fixed Alignment, not less than 1500 psi pull, average of 5 trials.
    - d. Humidity: ASTM D4585, no blistering, cracking, softening, and delamination of film after 10,000 hours exposure.
    - e. Salt Spray (Fog): ASTM B117, no blistering, cracking, or delamination of film. No more than 1 percent rust on plane and no more than 1/64 inch rust creepage at scribe and no rusting at edges after 10,000 hours exposure.

**2.5 ACCESSORY MATERIALS**

- A. Cleaners:
  - 1. General: Mildewcide, TSP (tri-sodium phosphate), acidic-detergent, zinc sulfate, sodium metasilicate, and solvents:
  - 2. Commercially available.
  - 3. Non-damaging to surface being cleaned
  - 4. Complying with PDCA Specification Manual.
  - 5. Acceptable to coating manufacturer.
- B. Metal Conditioner: Proprietary phosphoric acid based, etching type solution; acceptable to coating manufacturer.
- C. Rust Inhibitor:
  - 1. Water containing 0.32 percent by weight of sodium nitrite and 1.28 percent by weight of secondary ammonium phosphate (dibasic).
  - 2. Water containing 0.2 percent by weight of chromic acid, sodium chromate, sodium dichromate, or potassium dichromate.
- D. Spackling compound, putty, fillers, liquid de-glosser, patching plaster, thinners, and materials not indicated but required to achieve finishes. Compatible with coating system and acceptable to coating manufacturer.

- E. Do not use products of different manufacturers in combination, unless approved by each manufacturer of products involved.

## **2.6 MIXING**

- A. Use factory prepared colors matching approved samples. Site tinting will not be permitted.
- B. Thoroughly mix and stir coating components before use to ensure homogeneous dispersion of ingredients. Prior to application, blend multiple containers of same material and color by pouring from one container to another several times to ensure uniform consistency, color, and smoothness.
- C. Mix in clean pails of material recommended by manufacturer to avoid contamination.
- D. Mix only enough of multi-part coatings to allow application within pot life of mixture.
- E. Remove film which may form on surface of material in containers and strain material before using. Stir frequently during use to maintain pigments in suspension. Do not stir film into material.
- F. Apply coatings of consistency instructed by manufacturer.
- G. Thinning:
  - 1. Provide thinners approved by coating manufacturer.
  - 2. Add thinners within manufacturer recommended limits.

## **2.7 COLORS AND SYSTEMS**

- A. Systems: Refer to Coatings Schedule at end of Section.
- B. Colors: As selected by Architect.

# **PART 3 - EXECUTION**

## **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Measure moisture content of surfaces using recently calibrated electronic moisture meter. Do not apply coatings if moisture content of surfaces exceeds lesser of percentages listed below or those required by coating manufacturer. If excess moisture content exists and cannot be reduced, obtain written approval of coating manufacturer before application of coatings.
  - 1. Gypsum board and gypsum plaster: 17 percent.
  - 2. Masonry, Concrete, CMU, and Portland Cement Plaster: 17 percent for solvent reduced coatings. Test concrete floors in accordance with ASTM D4263.
- C. Prior to applying alkali and acid sensitive coatings, test substrate pH. Substrate pH shall not exceed pH tolerance recommended by manufacture.

## **3.2 PREPARATION**

- A. Protect completed construction from damage. Furnish drop cloths, shields, and protective methods to prevent spray, splatter or droppings from disfiguring other surfaces.
- B. Remove surface hardware, mechanical diffusers, escutcheons, registers, electrical plates, light fixture trim, fittings, fastenings and similar items prior to preparing surfaces for finishing. Provide surface-applied protective masking for non-removable items. Carefully store removed items for reinstallation.
- C. Remove mildew by scrubbing with mildewcide. Rinse thoroughly with clean water.
- D. Before beginning application of coatings, ensure surfaces are clean, dry, and free of dirt, dust, rust, and rust scale, oil, grease, mold, mildew, algae, efflorescence, release agents and other harmful materials which could adversely affect coating adhesion and finished appearance.

## **3.3 SURFACE PREPARATION FOR NEW WORK**

- A. General:
  - 1. Correct minor defects.
  - 2. Remove temporary labels, wrappings, and protective coverings from surfaces to be coated.
  - 3. Seal stains, marks, and other imperfections which may bleed through surface finishes.

- B. Concrete:
  - 1. Prior to application of coatings, allow surfaces to cure minimum 60 days.
  - 2. Remove dirt, scale, powder, laitance, and bond breakers by light sandblasting to minimum 1.5 mil profile.
  - 3. Remove oil and grease with solution of TSP; rinse well.
  - 4. Remove stains caused by weathering and corroding metals with solution of sodium metasilicate applied after thoroughly wetting surface with potable water; allow to dry.
  - 5. Fill cracks and voids with compatible filler.
- C. Masonry:
  - 1. Prior to application of coatings, allow surfaces to cure minimum 28 days.
  - 2. Remove dirt, scale, loose mortar, efflorescence, and powder by wire brushing.
  - 3. Remove oil and grease with solution of TSP, rinse, and allow to dry.
  - 4. Remove stains caused by weathering and corroding metals with solution of sodium metasilicate applied after thoroughly wetting surface with potable water; allow to dry.
  - 5. Wash and neutralize surfaces as recommended by coating manufacturer, rinse, and allow to dry.
- D. Galvanized Steel: Remove soluble and insoluble contaminants and corrosion. Sweep (Abrasive) Blasting per ASTM D6386 to achieve a uniform anchor profile (1.0 - 2.0 mils).

### 3.4 APPLICATION

- A. General:
  - 1. Coat surfaces specified, scheduled, illustrated, and otherwise identified unless specifically noted otherwise.
  - 2. Apply coatings of type, color, and sheen as scheduled.
  - 3. Apply products in accordance with manufacturer's instructions. Use application materials, equipment, and techniques as instructed by coating manufacturer and best suited for substrate and type of material being applied.
  - 4. Do not apply finishes to surfaces that are improperly prepared.
  - 5. Quantify of coats specified are minimum quantify acceptable.
  - 6. Apply coating systems to achieve scheduled total dry film thickness.
  - 7. Apply material at not less than manufacturer's instructed spreading rate.
  - 8. Do not exceed maximum single coat thickness instructed by coating manufacturer.
  - 9. Do not double-back with spray equipment building up film thickness of two coats in one pass.
  - 10. Ensure that edges, corners, crevices, welds, and exposed fasteners, receive dry film thickness equivalent of flat surfaces.
  - 11. Finish edges of coatings adjoining other materials and colors sharp and clean manner, without overlapping.
- B. Prime Coats:
  - 1. Apply initial coat to surfaces as soon as practical after preparation and before subsequent surface deterioration.
  - 2. Apply primer to sash before glazing.
- C. Intermediate and Top Coats:
  - 1. Allow previously applied coat to dry before next coat is applied.
  - 2. Sand and dust lightly between coats as recommended by coating manufacturer.
  - 3. Apply each coat to achieve uniform finish, color, appearance, and coverage free of brush and roller marks, runs, misses, visible laps and shadows, hazing, bubbles, pin holes, and other defects.
  - 4. If stains, undercoats, and other conditions show through final topcoat, correct defects and apply additional topcoats until coating film is of uniform finish, color, and appearance.
- D. Replace trim, fittings, and other items removed for finishing.

### 3.5 FIELD QUALITY CONTROL

- A. General: Comply with requirements of Section 014000.

- B. Periodically test film thickness of each coat with wet film gage to ensure coatings are being applied to proper thickness.
- C. Request review of each applied coat by Architect [and manufacturer's representative] before application of successive coats. Only reviewed coats will be considered in determining number of coats applied.
- D. Immediately prior to Substantial Completion, perform detailed inspection of coated surfaces and repair or refinish abraded, stained, and otherwise disfigured surfaces.

### **3.6 CLEANING**

- A. Promptly remove spilled, splashed, and spattered coatings. Clean spots, oil, and other soiling from finished surfaces using cleaning agents and methods which will not damage materials.
- B. If completed construction is damaged beyond normal cleaning and repair by coating operations, replace damaged items at no additional cost to Owner.
- C. Maintain premises and storage areas free of unnecessary accumulation of tools, equipment, surplus materials, and debris.
- D. Collect waste, cloths, and material which may constitute fire hazards and place in closed metal containers; remove from site daily along with empty containers.

### **3.7 PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. Protect work of other trades against damage from coating activities. Correct damage by cleaning, repairing, replacing, and recoating as acceptable to Architect.
- C. Provide "Wet Paint" signs and other methods to protect newly coated surfaces. Remove when directed or when no longer needed.

### **3.8 COATINGS SCHEDULE**

- A. Interior Service Area, Catalyzed Epoxy.
  - 1. Surface: CMU walls and galvanized overhead surfaces.
  - 2. Block Filler at CMU: Type F1, DFT 5 mil.
  - 3. Intermediate Coat: Type E1, DFT 5 mil.
  - 4. Top Coat: Type E1, DFT 5 mil.
  - 5. Total DFT: 15 mil.

**END OF SECTION**



**SECTION 101000**  
**VISUAL DISPLAY SURFACES**

**PART 1 - GENERAL**

**1.1 SYSTEM DESCRIPTION**

- A. Design Requirements: Provide concealed fastening wherever possible.
- B. Fire Resistance Requirements:
  - 1. Test method: ASTM E84.
  - 2. Flame spread index: 25 or less.
  - 3. Smoke developed index: 0 to 450.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  - 1. Submit manufacturer's descriptive literature and product specifications for each product.
  - 2. Include information for factory finishes, accessories, and other required components.
  - 3. Include color charts for finish indicating manufacturer's full range of colors available for selection.
- C. Submit following Informational Submittals:
  - 1. Certifications specified in Quality Assurance article
  - 2. Qualification Data:
    - a. Submit manufacturer's qualifications verifying years of experience.
    - b. Include list of completed projects having similar scope of Work identified by name, location, date, reference names, and phone numbers.
  - 3. Manufacturer's Instructions: Submit manufacturer's printed installation instructions.
- D. Closeout Submittals:
  - 1. Operation and Maintenance Data: Submit manufacturer's printed, recommended regular cleaning instructions, stain removal instructions, and surface break-in instructions for markerboards.
  - 2. Warranty: Submit specified warranty in accordance with Section 017700.

**1.3 QUALITY ASSURANCE**

- A. Single Source Responsibility:
  - 1. Furnish products from one manufacturer for entire Project, unless otherwise acceptable to Architect.
  - 2. Provide each markerboard as complete unit, including trim and accessory items necessary for proper function.
- B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum 5 years documented experience.
- C. Certifications:
  - 1. Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.
  - 2. Submit Contractor's certification that products are installed in accordance with Contract Documents.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.

**1.5 SEQUENCING**

- A. Ensure finishes, including painting, are completed and accepted prior to installation of work of this Section.

**1.6 WARRANTY**

- A. Comply with provisions of Section 017700.
- B. Warrant installed markerboard units to be free from defects in material and workmanship for 2 years.
- C. Include coverage against loss of original writing and erasing qualities, cracking, crazing, flaking, chipping, discoloration, and other defects, provided Owner complies with manufacturer's maintenance instructions.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS:**

- A. Acceptable Manufacturers:
  - 1. Platinum Visual Systems, division of ABC School Equipment, Corona, CA.
  - 2. Claridge Products and Equipment, Inc., Harrison, AR.
  - 3. ADP Lemco, Inc., West Jordan, UT.
  - 4. Polyvision, Suwanee, GA.

**2.2 PORCELAIN STEEL MARKERBOARD**

- A. Materials:
  - 1. Enameling Sheet Steel Options:
    - a. Comply with ASTM A424, Type 1, commercial quality.
    - b. Aluminized stretcher-leveled sheet steel.
  - 2. Hardboard: Comply with AHA A135.4, tempered, smooth face.
  - 3. Particleboard: Comply with NPA A208.1, set with waterproof resin binder, sanded faces.
- B. Panel Construction:
  - 1. Face Sheet: Porcelain finish on 24 gage enameling sheet steel.
  - 2. Core: 1/4 inch thick hardboard or 3/8 inch particleboard.
  - 3. Backing Sheet: 0.015 inch aluminum foil.
- C. Fabrication:
  - 1. Pressure laminate face sheet and backing sheet to core using manufacturer's moisture-resistant thermoplastic adhesive.
  - 2. Fabricate as fixed panels.
  - 3. Fabricate units completely assembled in one piece without joints, unless manufacturer's maximum dimensions are exceeded.
  - 4. When Manufacturer's Maximum Dimensions are Exceeded:
    - a. Fabricate in minimum quantity of pieces and joints.
    - b. Fabricate units from equal size pieces, balanced around center of unit.
    - c. Factory pre-assemble and pre-fit components.
    - d. Disassemble for delivery ready for re-assembly at site.
    - e. Provide with spline-connected butt joint to produce a non-lipped joint between adjoining porcelain steel panels.
  - 5. Provide with manufacturer's standard mullion trim between porcelain steel panels and tackboard panels.
- D. Porcelain finish:
  - 1. Porcelain enamel, vitreous surface fused to steel substrate.
  - 2. Surface Texture: Writing surface cover coat with gloss finish intended for use with dry-wipe-off liquid felt-tipped markers.
  - 3. Color: White.

**2.3 ACCESSORIES**

- A. Trim:
  - 1. Frame and Chalk Rail:
    - a. Extruded aluminum, ASTM B221, alloy 6061, temper as required by manufacturer; minimum thickness of 0.062 inches.

- b. Fabricate frame with mitered corners, designed for direct attachment to walls without wood grounds.
  - c. Extend frame extrusions full heights and widths of unit in single piece construction.
  - d. Extend chalk rail full width of unit.
- 2. Provide frame trim on edges and joints of units.
- 3. Provide frame trim in manufacturer's standard widths.
- B. Metal Finish:
  - 1. AA M12C22A31.
  - 2. Clear anodized.
- C. Temporary Protective Cover: Polyethylene sheet, 8 mil thick.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Verify that internal wall blocking is ready to receive units and positioning dimensions are as required by manufacturer.

#### **3.2 INSTALLATION**

- A. Install in accordance with Section 017300 and, approved shop drawings.
- B. Provide shims for solid undistorted surfaces.
- C. Install units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.
- D. Install units flush with wall surfaces, level and square, and with flush smooth joints.
- E. Butt panels tight with concealed spline to hairline joint.
- F. Trim:
  - 1. Miter at corners and fit closely to provide hairline joints.
  - 2. Dress to remove burrs and sharp edges.
  - 3. Steel Stud Walls: Secure with countersunk oval head self-tapping screws at each intersection with steel stud.
  - 4. Masonry Walls: Secure with expansion shields and countersunk oval head machine screws.
  - 5. Match screw head finish to trim color.

#### **3.3 CLEANING**

- A. Clean as required by manufacturer. Do not use materials or methods which may damage finish and surrounding construction.
- B. Cover board surfaces with protective cover, taped to frame.
- C. Remove protective cover at date of Substantial Completion.

#### **3.4 PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. Protect finished work from damage or defacement and replace defective units as directed by Architect prior to final completion and acceptance of project at no additional cost to Owner.

**END OF SECTION**



**SECTION 101400****SIGNS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes:
  - 1. Code required signage.
  - 2. Dimensional letters and numbers.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit product data for each type of sign specified, including details of construction relative to materials, dimensions, profiles, and finishes.
- C. Shop Drawings:
  - 1. Submit shop drawings covering fabrication, installation and finish of specified systems.
  - 2. Include following:
    - a. Fully dimensioned plans and elevations with detail coordination keys.
    - b. Locations of exposed fasteners and joints.
    - c. Message list for each sign required, including large-scale details of wording and lettering layout.
  - 3. Setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.
  - 4. Templates: Furnish full-size spacing templates for individually mounted dimensional letters and numbers.
- D. Samples:
  - 1. Cast Acrylic Sheet and Plastic Laminate: Panel 8 inch square minimum for each material, color, texture, and pattern required. Include sample of graphic image process required, showing graphic style, and colors and finishes of letters, numbers, and other graphic devices.
  - 2. Aluminum: Each finish type and color, on 6 inch long sections of extrusions and not less than 4-inch squares of sheet or plate. Where finishes involve normal color and texture variations, include sample sets showing full range of variations expected.
  - 3. Dimensional Letters: Full-size representative samples of each dimensional letter type required, showing letter style, color, and material finish and method of attachment.

**1.3 QUALITY ASSURANCE**

- A. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.
- B. Regulatory Requirements: Comply with Authorities Having Jurisdiction and Americans with Disabilities Act (ADA) including ADA Accessibility Guidelines to accommodate barrier free design.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Acceptable Manufacturers
  - 1. 2/90 Sign Systems
  - 2. APCO Signs.
  - 3. ASI Sign Systems, Inc.
  - 4. Century Sign Builders.
  - 5. Vomar Products, Inc.

**2.2 MATERIALS**

- A. Aluminum Extrusions: Extrusions of alloy and temper recommended by sign manufacturer for type of use and finish indicated, and with not less than strength and durability properties specified in ASTM B221 for 6063-T5.
- B. Vinyl Die-Cut Lettering Film:
  - 1. Opaque nonreflective vinyl film, 0.0035-inch minimum thickness, with pressure-sensitive adhesive backing, suitable for exterior and interior applications.
  - 2. Color as selected by Architect.
- C. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to sign material and mounting surface.
- D. Colored Coatings for Acrylic Plastic Sheet: Colored coatings, including inks and paints for copy and background colors; recommended by acrylic manufacturers for optimum adherence to acrylic surface, and nonfading for application intended.

**2.3 CODE SIGNAGE**

- A. Braille: Use Contracted Grade 2 Braille whenever Braille symbols are specifically required. Dots shall be 1/10 inch on center within each cell with 2/10 inch space between cells. Dots shall be raised 1/40 inch above background.
- B. Sign Schedule: Provide signage as required by IBC codes and accessibility regulations and requirements. These include, but are not limited to:
  - 1. Illuminated Exit Signs: Refer to Division 26.
  - 2. Fire Doors
  - 3. Room Capacity
  - 4. Elevator Signs
  - 5. Accessibility Signs including accessible parking space signs, toilet facilities, doors to exitways.

**2.4 PANEL SIGNS**

- A. Produce smooth, even, level sign panel surfaces, constructed to remain flat under installed conditions.
- B. Unframed Panel Signs: Fabricate signs with edges mechanically and smoothly finished to conform with following requirements:
  - 1. Edge Condition: Square cut.
  - 2. Edge Color for Plastic Laminate: Edge color same as copy.
  - 3. Corner Condition: Square corners.
- C. Laminated Sign Panels: Permanently laminate face panels to backing sheets using manufacturer's standard process.
- D. Graphic Content and Style: Sign copy that complies with requirements indicated for size, style, spacing, content, position, material, finishes, and colors of letters, numbers, and other graphic devices.
- E. Subsurface Copy: Apply copy to back face of clear acrylic sheet forming panel face by process indicated to produce precisely formed opaque images free from rough edges.
  - 1. Use reverse silk-screen process to print copy; overspray copy with an opaque background color coating.
  - 2. Use Dupont Chromalin heat- and pressure-laminated photopolymer film system to form copy and background color.
    - a. Manufacturer has option of selecting either process indicated above, or using subsurface engraving process, as appropriate to copy form and economics of production.
- F. Raised Copy: Machine-cut copy characters from matte-finished opaque acrylic sheet and chemically weld onto acrylic sheet forming sign panel face. Produce precisely formed characters with square cut edges free from burrs and cut marks.
  - 1. Panel Material: Matte-finished opaque acrylic sheet.
  - 2. Raised Copy Thickness: Not less than 1/32 inch.

- G. Applied Copy: Die-cut characters from vinyl film with pressure-sensitive adhesive backing. Apply copy to exposed face of sign panel.
  - 1. Panel Material: Matte-finished opaque acrylic sheet.
- H. Quantity: As indicated on Drawings.

## **2.5 DIMENSIONAL LETTERS AND NUMBERS**

- A. Cast Letters and Numbers: Form individual letters and numbers by casting. Produce characters with smooth, flat faces, sharp corners, and precisely formed lines and profiles, free from pits, scale, sand holes, or other defects. Cast lugs into back of characters and tap to receive threaded mounting studs. Comply with requirements indicated for finish, style, and size.
  - 1. Metal: Aluminum.
  - 2. Letter Height: As indicated on Drawings.
  - 3. Letter Style: As indicated on Drawings.
  - 4. Finish: Baked Enamel by letter manufacturer.
  - 5. Color(s): As selected by Architect from manufactures full range

## **2.6 FINISHES**

- A. Metal Finishes: Comply with NAAMM "Metal Finishes Manual" for finish designations and applications recommendations.
- B. Aluminum Finishes: Custom finish to match Architect's sample.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Examine supporting members to ensure surfaces are at proper elevation and are free from dirt or other deleterious matter.

### **3.2 INSTALLATION**

- A. General:
  - 1. Locate sign units and accessories where indicated, using concealed mounting methods in compliance with manufacturer's instructions.
  - 2. Install signs and letters level, plumb, and at height indicated, with sign surfaces free from distortion or other defects in appearance.
  - 3. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using double-sided tape or velcro.
  - 4. Apply self-adhering pressure-sensitive letters in accordance with manufacturer's directions.
- B. Dimensional Letters and Numbers: Mount letters and numbers using standard fastening methods recommended by manufacturer for letter form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish letter spacing and to locate holes for fasteners.
  - 1. Projected Mounting: Mount letters at projection distance of 1/2 inch from wall surface indicated.

### **3.3 CLEANING AND PROTECTION**

- A. After installation, clean soiled sign surfaces according to manufacturer's instructions. Protect units from damage until acceptance by Owner.

**END OF SECTION**





**SECTION 101400**  
**MONTGOMERY COUNTY EXTERIOR SIGN SYSTEMS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. These specifications are written to support the design, fabrication and installation of signs for the Montgomery County Department of General Services (DGS) hereafter referred to as the "Owner". The Sign Contractor shall be responsible for programming, the final design and documentation of sign assembly, fabrication and installation of sign systems as described on drawings, sign message schedule, sign location plans, specifications and approved shop drawing and layout submissions. The work will follow guidelines established in the Montgomery County Manual of Exterior Sign Standards for County Facilities.
- B. Specifications Includes:
  - 1. Exterior freestanding, wall mounted and suspended, illuminated and non-illuminated sign types
  - 2. Reflective Regulatory signage from MUTCD Standards and similar applications on sign panels
  - 3. Computer cut and digitally printed film / vinyl graphics applied to sign panels and painted surfaces
  - 4. Digital printed graphics on film applied to sign substrate materials
  - 5. Applications of UV inhibiting film for signs exposed to sunlight
- C. Related Sections: The General Conditions of Contract Between Owner and Sign Contractor, Solicitation, and Bid and Award Sheet and Quotation Sheet, Drawings, the Sign Message Schedule and Sign Location plans for facilities described; relate to Work of this Section.

**1.2 REFERENCES**

- A. Reference Standards: In addition to requirements shown or specified, comply with applicable provisions of the following agencies for design, materials, fabrication, and installation of component parts:
  - 1. ANSI/CABO A117.1 - Accessible and Usable Buildings and Facilities
  - 2. ADA – Americans With Disabilities Act
  - 3. NFPA – National Fire Protection Association – 101 Safety to Life from Fires in Buildings and Structures
  - 4. ASTM B 209 (2007) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
  - 5. ASTM B 221 (2008) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles and Tubes
  - 6. AWS D1.1/D1.1M (2008) Structural Welding Code – Steel
  - 7. AWS D1.2/D1.2M (2008) Structural Welding Code - Aluminum
  - 8. ASTM F-84 – American Society for Testing and Materials – Surface Burning Characteristics of Building Materials
  - 9. SSPC "Systems and Specifications", published by the Steel Structure Painting Council.
  - 10. NESA Sign manufacturing guidelines and standards.
  - 11. National and local Electrical Codes
  - 12. NAAM – Metal Finishes Manual

**1.3 DEFINITIONS**

- A. Pylon: Freestanding sign cabinet with welded structure for permanent attachment
- B. Blade Sign: Wall mounted projecting 2-sided internally illuminated cabinets with welded structure for permanent attachment
- C. Message Center: Programmable electronic panel of light emitting diodes [LED] for changeable messages.

**1.4 SYSTEM DESCRIPTION**

- A. Design Requirements:
  - 1. Sign Contractor is responsible for designing signage systems, including anchoring and suspension systems, weatherproof sign assemblies, and necessary modifications to meet specified requirements and maintain visual design intent of concepts expressed in drawings provided.
  - 2. Comply with requirements established on drawings for visual integrity of typography, lettering, numerals, graphics and mounting/installation configurations. Work shall be computer generated and precision executed. Printed signs to be resolution at minimum laser printer quality of 300 DPI.
  - 3. Drawings are diagrammatic and are intended to establish basic dimensions of units, sight lines, and profiles of units. Use computer generated typography employing matching Fonts as described on drawings. Fabrication details and requirements, such as attachment methods, jointing, seaming, bracing, and structural reinforcing shall be based on final, accepted shop drawings, not on the project drawings.
  - 4. Provide concealed fastening and connections wherever possible, unless shown otherwise.
  - 5. Attachment considerations: Account for site peculiarities and for expansion and contraction movement so there is no possibility of loosening, weakening, or fracturing of connections. Post/Tension structures limit depth of anchors in concrete to 1" maximum. Confirm all exact sign locations with the Owner prior to installation.
- B. Fire Resistance Requirements at coatings, finishes, and exposed materials: ASTM E84.
  - 1. Flame Spread Index: Not exceed 25.
  - 2. Smoke Density Index: Not exceed 50.
- C. Interface With Adjacent Systems:
  - 1. Integrate design and connections with adjacent building surface materials, conditions and structures.
  - 2. Confirm compatibilities of paints, films and coatings with manufacturers for surfaces where colors and materials are to be applied.
  - 3. Separate dissimilar materials to prevent corrosion as required for each mounting and attachment condition.

**1.5 SUBMITTALS**

- A. Quotation/Proposal: At award of contract, within 7 days, the Sign Contractor will submit unit pricing break down of lump sum quotation to include the performance of all services, including all labor, materials and equipment required for the complete fabrication and installation of the sign system described, at an agreed upon price and an agreed upon schedule for submissions, inspections and completion. Within one week of contract agreement, sign contractor will submit proposed schedule for fabrication and installation to the Owner for approval before commencement.
- B. The Sign Contractor will provide a list of sub-contractors and sources / manufacturers, with contact information, for the Owner's future reference in re-orders and replacements.
- C. The Sign Contractor will provide a Progress Report and Revised Schedule / Gantt Chart, weekly, to advise the Owner of the project status from start to finish.
- D. Shop Drawings: For each sign type required, provide 3 sets (minimum 11x17) of detailed fabrication/shop drawings, with all dimensions, product data specified, indication of all colors and quantities, for Owner approval, prior to fabrication and installation. Files are to be delivered with prints, in native and PDF formatting to facilitate communications and approvals. Drawings to show all forms of mounting based on various location conditions and attachment/anchoring with indication of fasteners and adhesives. Drawings of signs/mounting for freestanding, projecting, suspended and illuminated units are required to include the seal of an appropriate Engineer, currently registered in Maryland, DC, Delaware or Virginia. Other registrations will be considered subject to the approval of the Owner. Drawings to include plan views, detailed sections, elevations and layouts of all sign types. One layout each is sufficient for typical conditions. Layouts for all longer or atypical messages, is required. Copies of bid drawings are not shop drawings. Owner approval of submissions does not relieve the Sign Contractor from Contract requirements.

- E. Layout Proofs and Templates: Submit scaled layouts for each typical typographic condition, (may be small scale) and a mock-up full size template typical of individual lettering conditions and super-graphics, for the Owner's final approval prior to painting. Approval after painting mock-up required before fabrication and installation of other locations. All layouts and proofs are to be clearly labeled, with sign type designation, and fabricator name, address, phone, fax, and email information.
- F. Samples: Submit 4 each of 8.5 by 11 inch samples of all paints colors, films, finishes, materials, and profiles. All samples are to be clearly labeled on back side, with sign type designation, specification of coating or material and fabricator name, address, phone, fax, and email information for Owner final approval prior to fabrication and installation. Confirm sample requirements with the Owner prior to submission.
- G. Proof of Programming: Submit field checked sign location plans and sign message schedules sufficient to prove understanding of quantities and locations, with shop drawings, for the Owner's final approval prior to fabrication and installation.
- H. Sign Contractor shall submit 4 sample 'draw-downs' at 8-1/2" by 11" of each color or coating to Owner for approval of painted finish, prior to production.
- I. Prototypes: For each type of sign required, Sign Contractor shall provide the Owner with examples or samples of signs in portion or scaled versions, sufficient to demonstrate product quality, execution and function. Prototypes are subject to the Owner's approval prior to production.
- J. Electrical Permits for all illuminated signs are the responsibility of the Sign Contractor to obtain, and furnish a copy to the Owner prior to or at installation.
- K. Product Data: Provide to the Owner all information, product names and numbers for all materials used in fabrication and installation of signs, in standard printed published forms including performance and maintenance criteria. Include manufacturer's instructions for applications, construction details, profiles and finishes for each material and type of sign required. Provide a list of all materials used in coating systems and all material safety data sheets.
- L. Warranty: Submit appropriate Warranties on all materials and fabricated units for the Owner archive. Minimums: All Signs – 1 year. Films (Vinyl) – 8 years. Paints – 5 years. LED units – 11 years, power source – 4 years. Other guarantees to be provided where applicable. Warranties shall cover manufacturing defects, material defects and defects in workmanship. Fading, cracking, warping, peeling, delaminating, rusting, corroding and structural failure, including distortion or premature malfunction, will be construed to mean failure because of faulty materials and workmanship. All warranty periods to begin the day of final acceptance of the entire project by the Owner.

## **1.6 QUALITY ASSURANCE**

- A. Single Source Responsibility: Sign Contractor is responsible to provide each product, sign type or component from a single sign type manufacturer. Work of sub-contractors is the responsibility of the Sign Contractor. Provide each sign as complete unit, including message, facing material, backing material, fasteners, and attachment devices and accessory items necessary for proper function.
- B. Manufacturer Qualifications: Sign Company specializing in manufacturing products specified here with minimum five years experience on similar sign types and projects.
- C. Fabricator Qualifications: Sign Company specializing in fabricating work specified here with minimum five years experience.
  - 1. Certify that fabricator has sufficient production capacity to fabricate, transport, and deliver work to site without causing delays in work.
  - 2. Certify that fabricator has experienced production crafts-persons and high-quality equipment, which enable fabricator to produce sign types specified.
  - 3. Installer Qualifications: Acceptable to the Owner, manufacturer and fabricator with experience on at least five projects of similar nature in past five years.
  - 4. Welder Qualifications: AWS, NAAMM & CDA certified within past 12 months for each type of weld required. Provide certificates verifying AWS qualifications for each welder employed on project.

- D. Engineer Qualifications, Structural: Registered professional engineer licensed to practice structural engineering in the Owner jurisdiction, (or other area with the Owner's advance approval) with minimum of five years experience in design of structures, foundations and components to satisfy wind load requirements and structural / mounting integrity as shown and sealed on shop drawings submitted for Owner approval prior to fabrication and installation of signs.
- E. Regulatory Requirements: Ensure flammable components comply with applicable portions of local, state, and federal codes, laws, and ordinances for flame spread and smoke developed indices.
- F. Exact Sign Locations: All sign locations are to be confirmed at the job-site with the Owner, for exact placement and dimensions, prior to generation of shop drawings, fabrication and installation and report any problems or anomalies to the Owner for response. Conduct pre-installation walkabout meetings to field locate signs, in accordance with Owner requirements prior to each phase of installation.
- G. Traffic control regulatory signs and symbols shall conform to the intent of the Manual of Uniform Traffic Control Devices, U.S. Department of Transportation, FHWA. Sizes vary, artwork shall be consistent.
- H. Substitutions of materials or processes will not be allowed without the prior written consent of the Owner during the Shop Drawing and Sample Submission phase of work.

### **1.7 PROJECT CONDITIONS**

- A. Environmental Requirements: Comply with manufacturer's written requirements under which products can be stored, applied and installed. Manufacturer's Temperature and Humidity limitations are to be respected.
- B. Verify Existing Conditions:
  - 1. Field-verify and survey all existing conditions prior to submission of shop drawings.
  - 2. Verify with field measurements and indicate on shop drawings, reporting and making adjustments where necessary affording the Owner the opportunity to suggest other locations or required alterations to existing design.
  - 3. Field verify acceptability of structural conditions for mounting of panel sign types. Provide extension attachment where panels are positioned over conduit.

### **1.8 MAINTENANCE**

- A. Touch-up Paint: Provide minimum one quart can of touch-up paint of each type and color of paint used. Label containers with product name and number, project name, sign type designation and date.
- B. Sign Contractor to provide maintenance and cleaning instructions in writing to the Owner to facilitate service and maintenance by the Owner and other contractors during the life of the signs. Sign Contractor to provide contact information for sub-contractors and fabricators or sources for sign types or other products provided.

## **PART 2 - PRODUCTS**

### **2.1 GENERAL**

- A. Provide materials and surfaces, which have been selected for their flatness, smoothness and freedom from surface blemishes wherever exposed to view on the finished unit. Visible surfaces which exhibit pitting, seams, roller marks, bubbles, wrinkles, distortion, warping, "oil-canning", stains, discolorations or other imperfections on the finished unit will not be accepted, and will be replaced immediately at the Sign Contractor's expense.
- B. Materials and construction methods for all exterior sign work shall be performed in accordance with the applicable requirements of the AASHTO, "Standard Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals", Twelfth Edition, 1977 and Interim Specifications thereto.

**2.2 METAL**

- A. Sheet Aluminum Sign Faces: ASTM-B209, Alloy 5052-H36, 5052-H38, or 6061-T6, minimum thickness 0.08", 0.125" or as shown on design drawings, for painted finish. Sign faces to be single sheet of aluminum, without seams or splicing of pieces to form whole.
- B. Extruded Aluminum, square tube, bars, rods for hanger assemblies: ASTM B221, alloy 6061-T6 or 6351-T5, with minimum thicknesses as shown on drawings.
- C. Standard metal square tube – hot dipped galvanized steel for sign support framing and support posts.
- D. Stainless Steel Sheet for Traffic Regulatory Signs: ASTM A240, UNS Number S30200 or S30400, precision cut with all edges and corners filed and eased to remove sharp.
- E. Wall mounted aluminum signs to fit flush or stand-off to wall surfaces and have eased corners (not rounded), mounted on aluminum brackets for mounting to concrete or masonry surfaces as required and as indicated on drawings.

**2.3 PLASTIC**

- A. Acrylic for Sign Faces:
  - 1. Material: Methylacrylate polymers.
  - 2. Type: cast acrylic sheets in size, thickness, clarity, opacity, texture, and color required for Project.
  - 3. Acceptable product and manufacturer: Plexiglas® G, Altuglas International Arkema Group [http://www.products.arkemagroup.com/altuglas/p2\\_allproducts\\_plex.cfm#1](http://www.products.arkemagroup.com/altuglas/p2_allproducts_plex.cfm#1) or equal.
- B. Polycarbonate for Illuminated Sign Faces:
  - 1. Translucent white polycarbonate for illuminated sign faces – minimum 1/4" thickness.
  - 2. Provide scratch and ultra-violet resistant coatings where required
  - 3. Acceptable products:
    - a. Tuffak® XL or equal White Diffusing, sheets in sizes and colors as indicated on design drawings [http://www.atoglas.com/atoglas/gb/solutions/d\\_secteurs13\\_5.htm](http://www.atoglas.com/atoglas/gb/solutions/d_secteurs13_5.htm)
    - b. Lexan®, <http://www.geplastics.com/gelexan/> or equal

**2.4 PRESSURE SENSITIVE FILM / GRAPHICS**

- A. UV Protective / Anti-Graffiti film 3M™ 8991 or 3642GPS on signs where sign location will subject sign to exposure by sun, or where sign position can be easily reached by vandals. Sign Contractor to confirm exact locations requiring film with Owner during Shop Drawing and Sample Submission phase of work. Over-laminate layers to cover entire face panel to protect graphics and background colors.
- B. Computer Cut Film (Vinyl) Graphics:
  - 1. Type: Pressure sensitive, high performance adhesive type; opaque, reflective and translucent as indicated on contract drawings.
  - 2. Thickness: 0.003 mils. maximum. At multiple layer conditions: 3 layers maximum.
  - 3. Spacing: As shown on drawings and as scheduled and as provided by the Owner's Designer in digital files. Optically review and refine kerning pairs to adjust spacing of letters for visual consistency following examples shown in drawings. Digital layouts from Owner's Designer to be employed for cutting film where practical. No manual condensing of type will be accepted. Submit layout proofs for Owner approval prior to affecting materials.
  - 4. Typography/Fonts/Artwork: Garamond Bold, as indicated and as shown on design drawings, and as provided in digital files from the Owner's Designer.
  - 5. Colors: As shown on drawings and as specified in sign message schedule where applicable.
  - 6. Acceptable Products and Manufacturers:
    - a. 3M™ Scotchcal™, [www.scotchprint.com](http://www.scotchprint.com), 1-800-328-3908, or equal.
    - b. 3M™ Scotchlite™ - Engineer Grade Reflective Sheeting, [www.scotchprint.com](http://www.scotchprint.com), 1-800-328-3908, or equal.

**2.5 ACCESSORIES**

- A. Cement For Acrylic Plastic: No. 4 cement, Industrial Polychemical Co. or equal.

- B. Adhesive Tape: Double-faced Foam tape: 3M™ Scotch™ Brand VHB acrylic closed-cell joining system type 4104 or approved equal in color/thickness recommended by Manufacturer. Sign plaques 12" square or larger employ 1" wide tape around all 4 edges. Sign plaques less than 12" square employ ½" wide tape around all 4 edges. Tape is used in combination with silicon adhesive to create permanent lamination. Use of tape at all 4 edges prevents spread of adhesive from out of edges. Edges to appear flush and smooth.
- C. Mastic Sealants/Adhesives: Polyisobutylene – non-hardening, non-skinning, non-drying, non-immigrating sealant, and GE200 Silicone Adhesive or equal.
- D. Gasket: minimum 1/8" thick black neoprene closed-cell sponge EPDM meeting UL requirement for tensile strength and elongation after 7 days aging at 113 degrees Centigrade, between hanger assemblies and garage surfaces at mounting hardware to separate dissimilar materials.
- E. Miscellaneous Hardware:
  - 1. Stainless steel fasteners for stainless steel and for aluminum items. Galvanized steel fasteners for steel items. Use tamper-proof screws where appropriate or where called for in the drawings.
  - 2. Fasteners: Stainless steel bolts, nuts, Lock-washers, anti-theft components for steel and for aluminum items. Fasteners are concealed from view and/or 'painted out' unless approved otherwise by the Owner.
  - 3. Anchors and Inserts: Non-ferrous metal anchors and inserts as required for corrosion resistance when set into concrete and masonry surfaces - HILTI 304SS-14-134, #5403020, #5520410 and ALCOA #Z238 or approved equal, as required. Maximum 1" embedment into existing concrete or masonry surfaces. Holes filled with epoxy grout for permanent hold.

## 2.6 ELECTRONIC MESSAGE CENTER

- A. Monochrome LED message center –matrix sized as shown on drawings, amber, high-resolution, 8mm for Urban Signs or 19mm for Suburban Signs: 2750 pixels/square meter resolution with characters sized as programmed and as shown on Design Drawings, for 100,000 hours expected life, overall cabinet painted black as shown on Design Drawings.
- B. System to include software for still and animated graphics, font editor, message logging, training and User Manual for the Owner archive.
- C. Units to have hard wire connection to CPU installed remote in 2 locations, powered by 120 volt, single-phase 60HZ provided by the General Contractor to sign location.
- D. No filters shall be provided at ventilation. Unit to be weatherproof and cooled by system provided.
- E. Acceptable Manufacturers:
  - 1. WatchFire / Time-O-Matic
  - 2. Daktronics
  - 3. Electro-matic Products, Inc.: Hyperion

## 2.7 GRAPHIC ELEMENTS

- A. Art Work: Sign Fabricator to provide layout, lettering, arrows and graphics in matching colors, fonts and artwork in accordance with digital files provided and approved shop drawings and proof sheets to satisfy design intent.
- B. Montgomery County Seal: 10" diameter 4-color Logo artwork to be digitally printed on adhesive backed translucent film for use on signs as indicated on drawings, and shall include UV protection over-laminate, matte finish as indicated on drawings.
- C. Montgomery County Seal: 6" diameter Line art from black & white version to be precision cut from adhesive backed translucent film for use on glass doors as indicated on drawings, and shall include UV protection over-laminate, matte finish, as indicated on drawings. Translucent film for seal on glass doors may be 3M™ "Frosted Crystal" 7725SE-324, or "White Diffuser" 3635-70, or "Silver" 3630-121. Film shall be reverse applied to inside surface of glass doors, positioned on center at 5'-0" above finished floor.

## 2.8 PAINTS, COATINGS, AND FINISHES ON SIGN PANELS, SIGN FACES

- A. Paint Color References: Color references are for color designation only. Refer to drawings for applicable color designations. Colors which may be indicated on drawings include:
  - 1. PMS: Pantone Matching System.
  - 2. MAP (Matthews Acrylic Polyurethane): Matthews Paint Company, or equal.
  - 3. 3M™ ScotchCal™ standard colors, or equal.
- B. Paint Formulation: Formulate paint materials with anti-mildew agents and carefully balance ultraviolet inhibitors for use on exterior materials and surfaces, low or no volatile compounds.
- C. Application:
  - 1. Properly prepare and prime surfaces following Manufacturer's recommendations and apply materials in well-ventilated Paint Booth environment. No spraying of paints or coatings will be allowed in active facilities.
  - 2. Apply materials by spray method best suited to obtain required finish matching approved samples.
  - 3. Ensure finish surfaces are free of marks, streaks, laps, runs, drips, dust, debris, bumps or pile-up of paints, with uniform even and solid coverage, satin finish unless noted otherwise.
  - 4. Each painting system (primer, intermediate and finish coat) shall consist of compatible materials produced by a single manufacturer sufficient to provide solid coverage.
  - 5. Clean drips, runs and smudges from the finished areas with the appropriate solvent as recommended by the paint coating manufacturer and allow drying and curing time before application of second or finish coats.
  - 6. Do not paint stainless steel, galvanized or non-ferrous metal surfaces unless directed otherwise.
  - 7. Painting Systems:
    - a. Aluminum and Acrylic Surfaces –
      - 1) Surface Preparation: Commercial de-greasing and solvent cleaning following paint manufacturer's requirements.
      - 2) First Coat/Shop Primer: Urethane Zinc-rich primer at 2.5-3.5 mils DFT (Tnemec Series 90-97 Tnemec-Zinc, Akzo Nobel Grip-Gard Washprimer, Matthews or approved equal)
      - 3) Intermediate Coat: Polyamidomine Epoxy coating 2.0-3.0 mils DFT (Tnemec Series 69 Hi-Build Epoxoline 11, Akzo Nobel Grip-Gard Plus 2.8, Matthews or approved equal)
      - 4) Finish Coat: High-Build Acrylic Polyurethane enamel, semi-gloss at 2.0-3.0 mils DFT (Tnemec Series 75 Endura Shield, Akzo Nobel Grip-Gard Plus 2.8, Matthews or approved equal)
    - b. Steel Surfaces –
      - 1) Surface Preparation: SSPC-SP6 commercial blast cleaning.
      - 2) First Coat/Shop Primer: Urethane Zinc-rich primer at 2.5-3.5 mils DFT (Tnemec Series 90-97 Tnemec-Zinc or approved equal)
      - 3) Intermediate Coat: Polyamidomine Epoxy coating 2.0-3.0 mils DFT (Tnemec Series 69 Hi-Build Epoxoline 11 or approved equal)
      - 4) Finish Coat: High-Build Acrylic Polyurethane enamel, semi-gloss at 2.0-3.0 mils DFT (Tnemec Series 75 Endura Shield, Akzo Nobel, Matthews or approved equal)

**PART 3 - EXECUTION****3.1 GENERAL**

- A. All work shall be fabricated to details shown on the drawings and shall be first class workmanship in accordance with the best trade practices. All fabrication and assembly will be done in the factory and shipped to the jobsite as one complete unit (unless field cutting to appropriate length required). All joints, corners, miters, splices, etc. shall be accurately machined, filled, fitted, filed, and rigidly framed together at joints and contact points and painted smooth to give a monolithic appearance and imperceptible joints. All mechanical fasteners shall be painted to match color and finish of area where they occur. All exposed metal surfaces shall be primed and painted smooth with unblemished finish. There shall be no visible connections without the prior approval of the Owner.
- B. Paints and coatings to be thoroughly dry and cured prior to application of films and vinyl to prevent failures due to off-gassing and or conflict due to insufficient drying time allowed. Sign failures, bubbles or de-lamination caused by premature applications of films and vinyl prior to full drying or curing of coatings will be immediately replaced at Sign Contractor's expense.
- C. All surfaces shall be covered with protective cover non-deleterious to finish for protection until final installation. Sign panels shall remain covered until such time as message is required to be revealed by the Owner. Coordinate installation with the Owner. Label all signs on wrapping to follow sign message schedule designations, and deliver in logical order for installation.
- D. Sign Contractor to supply and install "Caution" tape, cones, barricades, and flagging people as required by the Owner in areas to be blocked for work.
- E. The Owner will supply "No Parking" signs (with space for date of closure to be inserted), to be installed in each closed parking space by Sign Contractor if required for installation of signs during business hours.

**3.2 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with the contract drawings. Sign Contractor to coordinate inspections to allow the Owner or Owner's Designer to be present to assist, during daylight business hours.
- B. The Owner reserves the right to examine work in fabrication shop before shipment to project site. Examination of Work does not limit or negate the Sign Contractor's responsibility for proper completion of the work.
- C. Acceptance of Surfaces: Surfaces to be printed or painted on shall be free from foreign matter such as residues of dust, debris, and grease. Confirm acceptability of surfaces to be printed on or painted or finished and notify the Owner in writing of defects or conditions which may affect the satisfactory execution or permanency of the finishes. Application of finishes shall not proceed until adverse conditions have been corrected.
- D. Before sign components are designed for shop drawings, produced, or delivered to the site, Sign Contractor shall examine the locations in which the signs are to be installed, mounted or suspended, and report in writing to the Owner any conditions which will prevent proper execution of the work or endanger permanency. The erection of signs shall not proceed until such conditions are corrected or adjusted to the satisfaction of the Owner.

**3.3 PREPARATION**

- A. Clean substrate surfaces in accord with adhesive manufacturer's instructions. Before applying succeeding coats, prior and undercoats shall be completely integral, cured and dry and shall perform the function for which they were specified. Properly prepare and touch up all scratches, abrasions or other disfigurements and remove any foreign matter before proceeding with the following coat. All spot-priming or spot-coating shall be feather-edged into adjacent coating to produce a smooth level surface.
- B. Protect adjacent surfaces from damage, over-spray and from adhesive drippings.
- C. Mill finish metals will be free of scrapes, dents or any other imperfections, for work to receive paint and vinyl coatings, cleaned as required by coating Manufacturer.



**3.4 FABRICATION - GENERAL**

- A. Metal Thickness:
  - 1. Metal thickness indicated establishes minimum conditions to maintain required flat face appearance.
  - 2. When metal thickness is not indicated, provide thickness most appropriate for Project condition to prevent oil canning and warping, but not less than following:
    - a. Sheet steel Galvanized: 1 mm (20 gauge) nominal thickness.
    - b. Aluminum: 3.125, 2.25 mm / 0.125 and 0.080 inch thickness minimum.
- B. General:
  - 1. Text and graphics shall be as shown or scheduled.
  - 2. Construct and finish work to eliminate burrs, cutting edges, and sharp corners.
  - 3. Finish welds on exposed surfaces to be imperceptible in finished work
  - 4. Except as indicated, finish surfaces smooth.
  - 5. Furnish flat surfaces without bulges, oil-canning, or other physical deformities
  - 6. Furnish curved surfaces with smooth, free-flowing shape.
  - 7. Provide concealed fasteners.
  - 8. Fabricate access panels tight-fitting, lightproof, and flush with adjacent surfaces for illuminated signs.
  - 9. Conceal identification labels and UL labels inside signs. Do not apply labels which cannot be concealed.
  - 10. Carefully follow manufacturer's recommended fabricating procedures regarding expansion/contraction, fastening, and restraining of acrylic plastic.
  - 11. Exercise care to ensure that surfaces are unblemished in finished work.
  - 12. Isolate dissimilar materials.
  - 13. At galvanized steel sheet or posts, Galvanize in accordance with ASTM A123.

**3.5 FABRICATION - ALUMINUM SIGNS**

- A. Aluminum sign face panels: Aluminum signs shall be fabricated from cold rolled pattern leveled sheet aluminum, conforming to ASTM B209, Alloy No. 5005H32. Each panel shall be precision cut from a single sheet of material. Corners shall be coped, and ground smooth on exposed faces.
- B. Individual Letters: Precision cut from 1/2" thick aluminum with edges filed to remove sharp. All surfaces chemically cleaned, primed & painted with acrylic polyurethane sating finish in color as indicated on drawings. Letter size and font as indicated on drawings. Font of cut letters to match layout on drawings exactly. Digital art to be available from Designer and employed in cutting letters. Letters to be mounted with concealed 1/4" threaded aluminum rod to fit pre-drilled holes in building surface as engineered by Sign Fabricator. Verify field conditions prior to submission of shop drawings with all dimensions for sign placement and sections through mounting.
- C. Comply with AWS, NAAMM, CDA and other metal authorities for recommended procedures in welding, brazing, and soldering. Use filler metals, which will blend with and match the color of sheet metal being used and the required exposed finish appearance of the metals. Continuously weld, braze and solder corners and seams and edges and grind smooth and flush on all exposed surfaces.
- D. Locate fasteners to be concealed wherever possible, otherwise to be as inconspicuous as possible. Size to securely support the work and space to prevent buckling or waviness on the finished surface. Exposed fasteners shall be countersunk, and filled or painted to match surface. Indicate type and location of all fasteners on shop drawing submittals.
- E. Drill and tap holes required for securing closures to other surfaces. All fasteners shall be countersunk flush to surface unless shown otherwise.
- F. Provide contiguous concealed support at joints to hold meeting faces flush in alignment. Miter or cope trim members at corners to form tight joints.
- G. Film / vinyl messages shall be cut and applied to painted aluminum or acrylic surfaces by means of an automated computerized cutting system, following layouts from design drawings, digital files provided and approved shop drawings or approved proofs.

- H. Integrity: Execute messages in such a manner that edges and corners of finished letterforms are true and clean. Letterforms with round positive or negative corners, non-uniform stroke widths, nicks, cuts, or ragged edges will not be acceptable.
- I. Pin-mounted Aluminum Panels - Welded Frame Construction (where required): Alloy 5005 H14, 0.125 and 0.080 inch thickness minimum unless noted otherwise. Mounting distance from wall surface: As shown and as required to fit flush as possible on concrete and masonry wall surfaces and projecting over conduit as required.
- J. Form closures and trim members and extrusions to the profiles shown using the gauge sheet metal shown. Furnish all components required for support and installation of closures and trim. Fabricate closures and trim tightly close with adjoining work. Finish all exposed edges of all trim and closure strips. All joints in exposed work shall not vary more than 1/32" in either width or alignment.
- K. Signs surfaces at exterior locations and all signs mounted at exterior where exposure to sun and elements may cause fading, shall receive protective layer of 3M™ 8991 or 3642GPS film or equal in single sheet over entire surface.

### 3.6 INSTALLATION

- A. Prior to installation, approval of all final sign locations shall be provided by the Owner.
  - 1. Install in accordance with manufacturer's printed instructions and approved shop drawings. Installation may be required during evening hours to prevent conflict with building function. When installing during daylight hours, Sign Contractor to provide all necessary MUTCD traffic control signage, and a traffic redirection (flagging people) whenever working in the drive aisle or near the entrances or exit lanes.
  - 2. During regular business hours, traffic and pedestrian flow must not be impeded without prior consent by the Owner. Provide 48 hours notice minimum prior to trips to job site to install signs.
  - 3. Apply materials under adequate illumination, evenly spread and smoothly flowed-on without runs, sags, skips, crawling, clogging of lines or angles or other defective coverage. Edges shall be clean, true and sharp, without saw-tooth jagged appearance. Blends shall be smooth and consistent throughout entire run, unless otherwise specified.
  - 4. Verify exact signage locations with the Owner at project site during normal business hours (daylight) for all sign types in typical positions, providing minimum 48 hours notice of scheduled times in advance.
  - 5. Remove and replace existing signs at all locations where a new sign is indicated, or as specified by the Owner. All signs removed remain the property of, and are to be returned to the Owner.
  - 6. Install signs plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with adjacent surfaces. See drawings for specific placement details, and confirm particulars at all sign locations with the Owner prior to installation.
  - 7. Securely anchor work with fasteners appropriate for anchorage condition, as engineered by Sign Contractor's Engineer on Shop Drawings. Weight of signs and associated loads to be expressed with final specification of anchors, with product numbers, on shop drawings with Engineer's Seal, for Owner approval prior to fabrication and installation.
  - 8. No sign units or materials may be stored at job sites without prior approval of the Owner's project representative. If storage is allowed, materials are to be arranged to prevent vandalism, theft, tripping hazard or any other damage at Sign Contractor's risk and expense.
- B. Illuminated Sign Cabinets:
  - 1. The Contractor shall coordinate with the General Contractor for provision of electrical and communications cable service where required. Power / conduit / remote junction boxes / concealed transformers and related systems shall match 277 or 120 volt (if existing condition) to service all illuminated sign locations. Sign power requirements to be coordinated for each illuminated sign location with the Owner prior to generation of shop drawing submissions.

2. Final hook-up and testing for operation of all units to be completed by Maryland licensed electrician employed by Sign Contractor. Owner's representative to be present at testing and acceptance is subject to Owner approval of sign function and serviceability. All work to be coordinated with the General Contractor and other trades for exact placement of switches, timers, photocells and concealed connections where possible.
3. Illuminated sign faces employ LED lighting by Series ED12-CW Cool White FLEX Pre Wired one module per foot: by [www.electraled.com](http://www.electraled.com), Sloan®, US LED or equal, with SL-B scotch locks, HEYCLIP 3893 wire clips and C2240-12 12 volt transformers as required by sign size and layouts designed and submitted by Sign Contractor.
4. Sign Contractor to field verify and document conditions at illuminated sign locations and represent final configuration on shop drawing submission for Owner approval.
5. Shop drawing submissions to include the seal of a licensed engineer for confirmation of attachment and serviceability of all signs over one pound in weight.
6. Sign Contractor is responsible for procurement and cost of required electrical permits to facilitate installation and final hook-up of all illuminated signs. Sign Contractor to furnish the Owner with copies of all permits prior to installation.
7. Illuminated pylon to include code-required on/off switch, mounted to sign skirt on base or vertical surface of projecting units, on side closest to the building, out of sight.
8. Illuminated Sign Cabinets to be weatherproof and water tight, with 'weep holes' at bottom as required to allow for release of condensation, and vents where required to provide for cooling.

### **3.7 ADJUSTING**

- A. Touch-up scratched, marred, abraded, or otherwise damaged surface to match original/adjacent finishes.
- B. Repair finishes damaged by cutting, welding or grinding operations required in shop or site fitting and joining. Restore finishes and paint so that there is no evidence of corrective work. Return items which cannot be refinished in the field, to the shop for completion and install when unit is complete, subject to the approval of the Owner.
- C. Remove support tape, spacers and protective coverings when the Owner directs exposure of message.
- D. Signs scathed or damaged by installation may be rejected by the Owner and are subject to immediate replacement at Sign Contractor's expense.

### **3.8 CLEAN UP**

- A. Clean surfaces of each sign type in accordance with manufacturer's suggestions. Provide manufacturer's maintenance instructions and contact information to the Owner for each sign type, for future reference.
- B. Clean Project site daily, including all work areas and landscaped areas, free of rubbish, litter and foreign substances resulting from work of this Section. Sweep paved areas to broom clean condition; remove stains, spills and other foreign deposits. Wipe away excess adhesive and remove any visible tapes or mounting systems. Rake grounds that are neither paved nor planted to an even-textured surface.
- C. Place paint or solvent soaked rags, waste or other materials which might constitute a fire hazard in metal containers and remove from premises at the close of each day's work. Take every precaution to avoid fire hazard.
- D. Protect all adjacent areas and surfaces in work at job site to prevent damage or injury.

### **3.9 ATTIC STOCK**

- A. Provide minimum 1 quart sealed containers of each sign surface color/coating for Owner use in follow up, touch up, repair and maintenance of signs, clearly labeled for Owner storage, delivered to job site at installation.

- B. Provide minimum 1 gallon sealed containers of each super-graphic surface color / coating for the Owner's use in follow up, touch up, repair and maintenance of signs, clearly labeled for Owner storage, delivered to the Owner's project representative (not building staff), at job site, at installation.

End of Montgomery County Exterior Sign Systems Specifications

**END OF SECTION**

**SECTION 102114**  
**TOILET COMPARTMENTS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes: Solid Color Reinforced Composite (SCRC) toilet compartments, urinal screens and shower partitions as indicated.
- B. Related Section:
  - 1. Section 102813 - Toilet Accessories.
- C. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select materials to maximize use of recycled materials.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit manufacturer's product data, parts list, and catalog cut sheets.
- C. Shop Drawings:
  - 1. Indicate layouts, swing of doors, elevations, anchorage and mounting details, components, hardware, finishes, and relevant dimensions.
  - 2. Furnish template drawings for anchorage locations in supporting members for attachment of compartments.
- D. Samples: Submit full range of color samples of finish on metal substrate for Architect's selections; color photo representations are not acceptable.
- E. Manufacturer's Instructions: Submit manufacturer's printed installation instructions.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Toilet Compartments and Accessories
  - 2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post-consumer recycled content of metal materials based on material cost per weight for the following materials:
    - a. Toilet Compartments and Accessories
  - 3. LEED Credit MRc5: Provide manufacturer name and location data for the following materials:
    - a. Toilet Compartments and Accessories.

**1.3 QUALITY ASSURANCE**

- A. Regulatory Requirements: Comply with Authorities Having Jurisdiction and Americans with Disabilities Act (ADA) including ADA Accessibility Guidelines to accommodate barrier free design.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Deliver materials to job site with manufacturer's labels intact and legible, in original packages or containers. Materials shall be kept dry during storage period.
- C. Use means as necessary to protect compartments and screens before, during and after installation. In event of damage, immediately make necessary repairs and replacements.

**1.5 SEQUENCING AND SCHEDULING**

- A. Coordinate Work with placement of anchorage devices. Supply rough-in data in sufficient time to provide concealed preparatory work.

**1.6 WARRANTY**

- A. Furnish ten-year limited warranty for panels, doors, and stiles against breakage, corrosion, delamination, and defects in factory workmanship.
- B. Furnish one-year guarantee against defects in material and workmanship for stainless steel door hardware and mounting brackets.

**PART 2 PRODUCTS****2.1 MANUFACTURERS**

- A. Basis of Design: Sierra Series 1091, Bobrick.
- B. Color: Refer to Materials List on Drawings.

**2.2 SYSTEMS**

- A. Partitions: Solid color reinforced composite material.
  - 1. Toilet Compartments: Floor-mounted, overhead-braced.
  - 2. Urinal Screens: Wall-mounted type.
  - 3. Shower Screens: Floor-mounted.

**2.3 MATERIALS**

- A. Toilet compartments, panels, doors and pilasters shall be non-corrosive, floor-mounted, overhead-braced:
- B. Panel Material: Solid color reinforced composite material composed of dyes, organic fibrous material, and polycarbonate/phenolic resins. Material shall have a non-ghosting, graffiti-resistant surface integrally bonded to core through a series of manufacturing steps requiring thermal and mechanical pressure. Edges of material shall be the same color as the surface.
  - 1. Doors and Stiles: 3/4-inch.
  - 2. Panels: 1/2-inch.
- C. Head Rail Bracing: Extruded aluminum, anti-grip style, clear anodized finish.
- D. Leveling Device: 7-gage, 3/16-inch hot rolled steel bar; chromate treated and zinc-plated, through bolted to base of solid color reinforced composite stile.
- E. Stile shoe: One-piece, 4-inch high, type 304, 22 gage stainless steel with satin finish. Top shall be 90 degree return to stile. Shoe will be composed on one-piece of stainless steel and capable of being fastened (by clip) to stiles starting at wall line.

**2.4 HARDWARE**

- A. Hardware: 18-8, type 304 stainless steel with satin finish.
  - 1. Hardware of chrome plated "Zamak" aluminum, or extruded plastic is unacceptable.
- B. Latch:
  - 1. Sliding: 14 gage slide on nylon track.
  - 2. Requires less than 5-lb force to operate. Twisting latch operation will not be acceptable.
  - 3. Latch Track attached to door by machine screws into factory-installed threaded brass inserts.
  - 4. Threaded brass inserts factory installed for door hinge and latch connections and able to withstand a direct pull exceeding 1,500 lbs. per insert.
  - 5. Through bolted, stainless steel, pin-in head Torx sex bolt fasteners shall be used at latch keeper to stile connects and shall withstand direct pull force exceeding 1,500 lbs. per fastener.
- C. Hinges
  - 1. Cam shall be adjustable in the field to permit door to be fully closed or partially open when compartment is unoccupied.
  - 2. Hinges shall be attached to door and stile by theft-resistant, pin-in-head Torx stainless steel machine screws into factory-installed, threaded brass inserts.
  - 3. Fasteners secured directly into the core are not acceptable.

4. Door shall be furnished with two 11-gauge (3-mm) stainless steel door stop plates with attached rubber bumpers to resist door from being kicked in/out beyond stile.
  5. Door stops and hinges shall be secured with stainless steel, pin-in-head Torx machine screws into threaded brass inserts.
  6. Threaded brass inserts shall withstand a direct pull force exceeding 1,500 lbs per insert.
- D. Coat Hook
1. Coat Hook shall be constructed of stainless steel and shall project no more than 1-1/8" (29 mm) from face of door.
  2. Coat hook shall be secured by to door by through-bolted, theft-resistant, pinin-head Torx stainless steel screws. Through-bolted fasteners shall withstand a direct pull force exceeding 1,500 lbs. per fastener.
- E. Mounting Brackets
1. Mounting Brackets shall be constructed of stainless steel and shall be mounted inside compartment.
  2. Fasteners at locations connecting panels-to-stiles shall utilize through bolted, stainless steel, pin-in-head Torx sex bolt fasteners. Through-bolted fasteners shall withstand direct pull force exceeding 1,500 lbs. per fastener.
  3. Wall mounted urinal screen brackets shall be 11 gauge double thickness.
  4. Disabled Accessible Hardware: Slide bolt door latch, wire pulls both sides of the door, and self closing hinges. Mount door hardware at 30 to 44 inches above finished floor.
  5. Each door for enclosures for the disabled shall be equipped with one door pull on each side and one wall stop. The inside and outside of the compartment door to disabled accessible stall must be equipped with a loop or U-shaped handle immediately below the latch. The latch shall be flip-over style, siding or other hardware not requiring flight grasping or twisting.

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Check areas scheduled to receive compartments for correct dimensions, plumbness of walls, soundness of wall surfaces, location of built-in anchorage/supporting devices, and other conditions that would affect proper installation of holding brackets and anchorage or suspension devices.
- C. Verify spacing of plumbing fixtures to ensure compatibility with compartment installation.

#### **3.2 INSTALLATION**

- A. Install partitions and screens in strict accordance with manufacturer's instructions, approved shop drawings, and as specified. Install straight, level and plumb.
- B. Check areas scheduled to receive compartments for correct dimensions, plumbness of walls, and soundness of surfaces that would affect installation of mounting brackets.
- C. Verify spacing of plumbing fixtures to assure compatibility with installation of compartments.
- D. Do not begin installation of compartments until conditions are satisfactory.

#### **3.3 ERECTION**

- A. Install compartments rigidly, straight, plumb, and level and in accordance with manufacturer's installation instructions.
- B. Installation methods shall conform to manufacturer's recommendation for backing and proper support.
- C. Conceal evidence of drilling, cutting, and fitting to room finish.
- D. Maintain uniform clearance at vertical edge of doors.

#### **3.4 ADJUSTING AND CLEANING**

- A. Adjust hardware for proper operation after installation.
- B. Set hinge cam on in-swinging doors to hold doors open when unlatched.

- C. Set hinge cam on out-swinging doors to hold unlatched doors in closed position.
- D. Clean exposed surfaces of compartments, hardware, and fittings.

**END OF SECTION**



**SECTION 102213**  
**WIRE MESH PARTITIONS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes: Mesh partition and double swing doors at 2<sup>nd</sup> Level Mezzanine.
- B. Related Sections:
  - 1. Section 087100 - Door Hardware: Cylinders for locking devices.
- C. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select materials to maximize use of recycled materials.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit descriptive literature and technical data on each component of system and of fabricated assembly.
- C. Shop Drawings:
  - 1. Submit shop drawings for fabrication and erection of wire mesh installation.
  - 2. Include plans, elevations, and large scale details showing door operations, hardware locations, anchorage, and accessory items.
  - 3. Provide location template drawings for items which attach to permanent construction.
- D. Submit following Informational Submittals: Certifications specified in Quality Assurance article.
- E. Manufacturer's Instructions: Submit descriptive literature on installation methods and procedures.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Wire Mesh Partitions
  - 2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post-consumer recycled content of metal materials based on material cost per weight for the following materials:
    - a. Wire Mesh Partitions
  - 3. LEED Credit MRc5: Provide manufacturer name and location data for the following materials:
    - a. Wire Mesh Partitions

**1.3 QUALITY ASSURANCE**

- A. Fabricator Qualifications: Member of Woven Wire Products Association and specializing in products specified for minimum of three years.
- B. Erector Qualifications: Company specializing in wire products installations with two years successful experience in completion of similar sized projects.

**PART 2 - PRODUCTS**

**2.1 PRODUCTS AND MANUFACTURERS**

- A. Acceptable Products and Manufacturers:
  - 1. Type 400A, AAA Partitions, King Wire Partitions, Inc., Los Angeles, CA.
  - 2. No. 130A, Acorn Wire and Iron Works, Chicago, IL.
  - 3. Type 4C, Kentucky Metal Products Company, Louisville, KY.
  - 4. No. 100M, Miller Wire Works, Inc., Birmingham, AL.
  - 5. Sure-Guard, The GS Company, Baltimore, MD.

**2.2 MATERIALS**

- A. Wire Mesh Partitions:
  - 1. Fabric: 1-1/2 inch diamond mesh, 10 gage crimped steel wire, securely clinched to frame.
  - 2. Vertical Frames: 1-1/4 by 5/8 inch cold-rolled "C" section channels with 1/4 inch bolt spacing between 12 and 15 inches OC.
  - 3. Horizontal Frames: 1 by 1/2 by 1/8 inch cold-rolled channels; joints mortised and tensioned.
  - 4. Center Reinforcing Bar:
    - a. 1 by 1/2 by 1/8 inch cold-rolled channel tensioned to side frames with wires passed through center bar.
    - b. Provide number of members to suit panel height per manufacturer's recommendation.
  - 5. Top Capping Bar: 2-1/4 by 1 inch cold-rolled channel with 1/4 inch "U" bolts 28 inch OC.
  - 6. Corner Posts: 1-1/4 by 1-1/4 by 1/8 inch angles with 1/4 inch bolt holes to match partition.
  - 7. Floor Sockets: 2-1/2 inch high ductile iron (weldable) with set screw adjustment.
  - 8. Hinged Door:
    - a. Frame: 1-1/4 by 1/2 by 1/8 inch channel with 1/4 by 1/8 inch flat bar cover three sides, 1-3/8 by 3/4 by 1/8 inch angle riveted to lock side.
    - b. Hinges: Three butt hinges riveted or welded to both door and frame.
    - c. Locks: Manufacturer's standard lock housing for master keying to building systems.
  - 9. Hardware: Mortise type locks on doors; (cylinder provided in Section 087100).
  - 10. Related Items: Bolts, hardware housing, and accessories required for installation.

**2.3 FABRICATION**

- A. Fabricate panels, doors, and other items to profiles and sizes indicated, with framing members fitted, reinforced, and braced to suit design requirements.
- B. Provide reinforced cut-outs for pipes, ducts, beams, and other items shown or as necessary for secure partition installation. Finish edges of cutouts for a neat, protective edge.
- C. Grind exposed welds flush and smooth.
- D. Make exposed joints flush and hairline.

**2.4 FINISHES**

- A. Electrostatic spray painted enamel, in color as selected by Architect from manufacturer's standard colors.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify substrates are complete, blocking and anchorage devices are properly placed, and that there are no irregularities present which would interfere with installation.

**3.2 PREPARATION**

- A. Measure and lay out intended locations. Measure parallel to surface of substrate.
- B. Locate and mark position of posts. Locate vertical posts at equal distance spacing, not exceeding 5'-0" centers.
- C. Begin Work only when substrates have been properly prepared.

**3.3 INSTALLATION**

- A. Install in accordance with Section 017300 and approved shop drawings.
- B. Erect partitions, plumb, rigid, properly aligned, and securely fastened in place.
- C. Provide additional field bracing as shown or necessary for rigid, secure installation.
- D. Anchor to floor with flanged universal support bases and compression pins.
- E. Attach wire fabric to rails with tension bars bolted to rails with tamper-proof fasteners spaced at 15 inches OC maximum.

- F. Install cylinder lock masterkeyed to building as part of Work of Section 087100.

**3.4 ADJUSTING**

- A. Adjust brace rails and tension rods for rigid installation.
- B. Tighten hardware, fasteners, and accessories. Adjust hardware to provide smooth operation of doors.
- C. Touch up damaged finish with matching paint.

**END OF SECTION**



**SECTION 102624**  
**STAINLESS STEEL BACKSPLASHES**

**PART 1 SUMMARY****1.1 SUMMARY**

- A. Section Includes:
  - 1. Stainless steel backsplash wrapped on particleboard, full height from quartz countertops to underside of cabinets above or as otherwise indicated.
  - 2. Manufacturer's associated accessories for attachment and trim.
- B. Related Sections:
  - 1. Section 064116 – Plastic Laminate Clad Wood Cabinets.
  - 2. Section 123664 - Engineered Stone Countertops.
- C. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select materials to maximize use of recycled materials.
  - 2. Select locally or regionally fabricated products wherever possible.
  - 3. Select adhesives and sealants meeting LEED requirements.
  - 4. Select panel core materials containing no added urea formaldehyde.

**1.2 SYSTEM REQUIREMENTS**

- A. Performance Requirements:
  - 1. Comply with UL 723 Class I characteristics as follows:
    - a. Flame Spread: 25 maximum.
    - b. Smoke Developed: 450 maximum.
  - 2. When used as part of fire rated assembly, provide devices capable of maintaining specified or indicated hourly rating when tested in accordance with ASTM E119.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit manufacturer's descriptive technical data including test performance data and performance characteristics for each product.
- C. Shop Drawings: Show built-in items, including sizes, types, materials, construction, finishing, anchoring, accessories, and preparation for installation of protection.
- D. Samples: Submit actual samples of stainless steel for Architect's selection.
- E. Submit following Informational Submittals:
  - 1. Certifications specified in Quality Assurance article.
  - 2. Qualification data: Manufacturer's qualification data.
  - 3. Manufacturer's instructions.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Toilet Compartments and Accessories
  - 2. LEED Credit MRc4 Recycled Content: Provide product data for products having recycled content. Include documentation indicating percentage weight of post-consumer and pre-consumer recycled content. Include statement indicating costs for each product having recycled content.
  - 3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
    - a. Stainless steel.

4. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
  - a. Adhesives and sealants.
5. LEED Credit EQc4.4 - No Urea Formaldehyde: Submit product data for each composite wood and panel product used indicating that bonding agent used contains no urea-formaldehyde.

#### **1.4 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacture and fabrication of stainless steel protection devices with 5 years experience.
- B. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

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

- A. Comply with requirements of Section 016000.

### **PART 2 - GENERAL**

#### **2.1 STAINLESS STEEL SPLASHES**

- A. Design: Cover designated areas as indicated on Drawings.
- B. Metal: 18 gage (0.0500 inch thick), Type 304 stainless steel sheet with #4 brushed finish to match Architect's sample.
- C. Sheet size and joint locations: As indicated on Drawings.
- D. Finish: #4 satin, vertical orientation.
- E. Anchor in conformance with design details.
  1. Concealed fasteners or clips.
  2. Adhesive bonded; as recommended by manufacturer.
- F. Install on particleboard core to prevent "oil-canning" or buckling, with flat smooth surface.
- G. Tightly butt joint and weld seams for a sanitary installation. Grind welds smooth and apply finish to blend with adjacent panels.

#### **2.2 ACCESSORIES**

- A. Particleboard Core:
  1. Comply with ANSI A208.1, phenolic resin particleboard
  2. General Purpose: Type 1-M-1.
  3. Water Resistant: Type 2-M-2 or 2-M-3.
  4. Maximize post-consumer waste material content with minimum of 80 percent.
  5. Urea-formaldehyde free and not exceed 0.30 PPM of formaldehyde, ANSI 208.1.
- B. Sanitary Sealants: Refer to Section 079200.
- C. Contact Adhesive: As recommended by woodwork fabricator to suit application.
  1. Adhesive: Water-based, formaldehyde free, maximum of 20 g/L VOC content.
- D. Primers and Adhesives:
  1. Waterproof.
  2. Materials required by wall protection product manufacturer for particular product and substrate moisture content and condition.
  3. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that meet or do not exceed the VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
    - a. Current requirement refers to the date on which the materials are installed in the building.

- b. A copy of SCAQMD Rule #1168 is included in Section 01352 that was current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
- c. Interior refers to all building construction that is inside of the exterior weatherproofing material.

### **PART 3 - PRODUCTS**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify that substrate finishes are complete and attachment devices in hollow walls are accurately located.

#### **3.2 INSTALLATION**

- A. Install in accordance with Section 017300 and approved shop drawings.
- B. Locate splashes where indicated.
- C. Use attachment devices or adhesive as specified and as recommended by manufacturer.

#### **3.3 CLEANING**

- A. Remove protective coverings at final cleaning stage.

**END OF SECTION**





**SECTION 102813**  
**TOILET ACCESSORIES**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select adhesives and sealants meeting LEED requirements.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit manufacturer's catalog cut sheets, and data sheets.
- C. Shop Drawings: Submit setting drawings, templates, instructions, and directions for installing anchorage devices and cut-out requirements in other work.
- D. Submit following Informational Submittals:
  - 1. Certifications specified in Quality Assurance article.
  - 2. Manufacturer's instructions.
- E. Closeout Submittals:
  - 1. Submit under provisions of Section 017700.
  - 2. Maintenance data.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit EQc4.1: Provide adhesive and sealant VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
    - a. Sanitary Sealant

**1.3 QUALITY ASSURANCE**

- A. Regulatory Requirements: Conform to ANSI A117.1 or local code if more stringent requirements are applicable for installing work for physically disabled persons.
- B. Certification: Provide verification of grab bar strength and installation.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Pack accessories individually with protective wrappings.

**1.5 KEYING**

- A. Dispense units keyed alike, furnish six keys. Key coin boxes separately from dispensing unit; furnish 6 keys.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Acceptable Manufacturers:
  - 1. A and J Washroom Accessories, Newburgh, NY.
  - 2. American Specialties, Inc., Yonkers, NY.
  - 3. Bobrick Washroom Equipment, Inc., North Hollywood, CA.
  - 4. Bradley Corporation, Menomonee Falls, WI.
- B. Bobrick accessories are specified, but items of equivalent design, sightlines, construction, size, function and capacity by manufacturers listed in paragraph above are also acceptable.

**2.2 MATERIALS**

- A. Stainless Steel:
  - 1. Sheet: ASTM A240, UNS S30400, 22 gage, except where specified otherwise.
  - 2. Tubing: ASTM A269, UNS S30400.
- B. Sheet Steel:
  - 1. Cold rolled: Commercial quality ASTM A336, 20 gage minimum. Surface preparation and metal pretreatment as required for applied finish.
  - 2. Galvanized steel: ASTM A653, G60 zinc coating.
- C. Aluminum Casting: ASTM B85.
- D. Fasteners: Screws, bolts, and other devices of same material and finish as accessory item, or of galvanized steel complying with ASTM A123 where concealed; theft-proof design at exposed conditions.
- E. Expansion Shields: Type as recommended by accessory manufacturer for component and substrate.
- F. Sanitary Sealant:
  - 1. One part silicone conforming to FS-TT-S-001543, FDA Regulation 21 CFR177.2600, and FDA Food Additive Regulation 121.2514.
  - 2. Color: White
- G. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that comply with VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
  - 1. Current requirement refers to the date on which the materials are installed in the building.
  - 2. SCAQMD Rule #1168 referenced in Section 018113 is current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
  - 3. Interior refers to all building construction that is inside of the exterior weatherproofing material.

**2.3 FABRICATION**

- A. Weld and grind smooth joints of fabricated components.
- B. Form exposed surfaces from single sheet of stock, free of joints.
- C. Form surfaces flat without distortion. Maintain flat surfaces without scratches or dents.
- D. Back paint components where contact is made with building finishes to prevent electrolysis.
- E. Shop assemble components and package complete with fasteners, anchors, and fittings.
- F. Provide anchor plates, adapters, and anchor components necessary for installation.

**2.4 FACTORY FINISHING**

- A. Galvanizing After Fabrication: ASTM A123, 1.25 ounce per square yard.
- B. Shop Primed Ferrous Metals: Pretreat and clean, spray apply one coat primer and bake.
- C. Stainless Steel: No. 4 satin luster.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify that site conditions are ready to receive work and dimensions are as indicated on shop drawings and instructed by manufacturer.
- C. Check openings for plumbness of blocking and frames.
- D. Beginning of installation means acceptance of existing conditions.

**3.2 PREPARATION**

- A. Deliver inserts and rough-in frames to site at appropriate time for installation.

- B. Provide templates and rough-in measurements as required.
- C. Verify exact location of accessories for installation.
- D. Protect adjacent or adjoining finished surfaces and work from damage during installation.
- E. Coordinate work with placement of wall reinforcement and reinforcement of toilet partitions to receive anchor attachments.
- F. Supply rough-in data in sufficient time to be built into other work.
- G. Do not install accessories until room finishes are completed.

### **3.3 INSTALLATION**

- A. Install in accordance Section 017300 and approved shop drawings.
- B. Install in accordance with manufacturer's instructions and with accessibility requirements of ADA and ANSI A117.1.
- C. Toilet paper and feminine napkin dispensers located on grab bar side of accessible toilet room or stall shall not project more than 3 inches from finished wall surface nor be located closer than 1-1/2 inch clear of tangent point of grab bar.
- D. Locate accessories in order that they do not interfere with door swings or use of fixtures. Install accessories after wall finishes have been completed.
- E. Toilet paper dispensers and other items located on grab bar side of accessible toilet room or stall shall not project more than 3 inches from finished wall surface and not be located closer than 1-1/2 inches clear of tangent point of grab bar.
- F. Install plumb, level, and securely anchored to substrate.
- G. Locate accessories in order that they do not interfere with door swings or use of fixtures. Install accessories after wall finishes have been completed.
- H. Anchor accessories with bolts, plates, and approved type fasteners.
- I. Install surface mounted accessories to backup material with toggle bolts, plumb and align.
- J. Grab bars:
  - 1. Anchor grab bars to drywall with concealed 16 gage steel anchor plates.
  - 2. Install grab bars in manner to support 500 pound hanging load placed at any point along bar length.
- K. Seal fastener holes with sanitary silicone sealant prior to mounting accessories and grab bars in showers. Set entire plate and perimeter trim in sealant to ensure watertight installation at penetrations to partitions.
- L. Adjust accessories for proper operation and smooth mechanical function.
- M. Clean and polish exposed surfaces after removal of protective coverings.

### **3.4 SCHEDULE OF ACCESSORIES**

- A. Furnish and install accessories as listed on the Drawing Sheet A-401.

**END OF SECTION**



**SECTION 104400**  
**FIRE PROTECTION SPECIALTIES**

**PART 1 - GENERAL****1.1 DEFINITIONS**

- A. Where indicated on Drawings, abbreviation "FEC" defines fire extinguisher and cabinet and abbreviation "FE" is for fire extinguisher without cabinet.
- B. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select materials to maximize use of recycled materials.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  - 1. Furnish manufacturer's descriptive literature.
  - 2. Include physical dimensions, operational features, color and finish, anchorage details, material descriptions, and type of hardware.
- C. Shop Drawings: Include rough-in measurements, locations, and details for cabinets.
- D. Samples: Submit sample of manufacturer's standard finish and color on actual base metal.
- E. Submit following Informational Submittals:
  - 1. Certificates: Submit certification attesting compliance with UL and NFPA requirements.
  - 2. Manufacturer's instructions: Submit installation instructions for fire extinguisher cabinets.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements:
  - 1. Product data sheets or other documentation for each product/material highlighting recycled content information.
  - 2. Product Data sheets or other documentation for each product/material highlighting location of manufacture and harvest/extraction if within 500 miles of the project.

**1.3 QUALITY ASSURANCE**

- A. Single Source Responsibility: Obtain products in this Section from one manufacturer.
- B. Regulatory Requirements: Comply with Authorities Having Jurisdiction and Americans with Disabilities Act (ADA) including ADA Accessibility Guidelines to accommodate barrier free design.
- C. Certifications:
  - 1. Provide extinguishers which are UL listed and bear UL rating for type and classification.
  - 2. Conform to NFPA-10 requirements for extinguishers.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.

**1.5 PROJECT CONDITIONS**

- A. Environmental Requirements: Do not store products subject to freeze damage in environments where damage could occur.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Acceptable Manufacturers:
  - 1. J. L. Industries, Bloomington, MN.
  - 2. Larsen's Manufacturing Company, Minneapolis, MN.
  - 3. Potter Roemer, Cerritos, CA.

**2.2 FIRE EXTINGUISHERS**

- A. Multi-Purpose Dry Chemical Type (Siliconized Mono Ammonium Phosphate) with Pressure Gage.
  - 1. Capacity: 5.0 pounds.
  - 2. UL Rating: 2A-10B:C.

**2.3 CABINETS**

- A. Fire Extinguisher Cabinet:
  - 1. Formed sheet metal 20 gage prime painted steel, epoxy finished interior.
  - 2. Recessed type.
  - 3. Cabinet Construction: Nonrated, except provide rated cabinet when recessed into rated partitions of same rating as partition.
  - 4. Size to accommodate fire extinguisher and accessories.
- B. Trim: Flat, stainless steel.
- C. Door:
  - 1. Material: Stainless steel.
  - 2. Thickness: 20 gage minimum, reinforced for flatness and rigidity.
  - 3. Latch: Roller latch.
  - 4. Door style: Solid panel.
- D. Mounting Hardware: Appropriate to cabinet.
- E. Graphic Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect. Individual press-on letters.

**2.4 ACCESSORIES**

- A. Fire Extinguisher Brackets: Wall brackets, size as required for cylinder used.

**2.5 FABRICATION**

- A. Form body of cabinet with tight inside corners and seams.
- B. Predrill holes for anchorage.
- C. Form perimeter trim and door stiles by welding, filling, and grinding smooth.
- D. Hinge doors for 180 degree opening with continuous piano hinge. Provide nylon roller type catch.

**2.6 FINISHES**

- A. Extinguisher: Red enamel.
- B. Cabinet Trim and Door: UNS S30400 stainless steel with No. 4 finish.
- C. Cabinet Interior: White epoxy.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify rough openings for cabinets are correctly sized and located.

**3.2 INSTALLATION**

- A. Install in accordance with manufacturer's printed instructions.
- B. Install cabinets plumb and level in wall openings at locations indicated on Drawings.
- C. Securely attach cabinets and mounting brackets in place to wall blocking.

**3.3 IDENTIFICATION**

- A. Identify fire extinguisher locations with following methods:
  - 1. For fire extinguisher locations without cabinets, use vertical decal spelling "FIRE EXTINGUISHER" applied to adjacent wall surface.

**END OF SECTION**

**SECTION 105113  
METAL LOCKERS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes:
  - 1. Wardrobe lockers.
  - 2. Ready gear lockers.
  - 3. Locker benches.
- B. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select materials to maximize use of recycled materials.
  - 2. Select locally or regionally fabricated products wherever possible.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit technical data and descriptive literature for each product.
- C. Shop Drawings: Submit drawings indicating locker locations, types, sizes, configurations, layout of groups, numbering, and accessories. Indicate details of fillers, trim, base, and accessories.
- D. Samples: Submit samples on metal substrate of each color in manufacturer's standard color range for Architect's selection.
- E. Manufacturer's Instructions: Submit detailed installation instructions.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements:
  - 1. Product data sheets or other documentation for each product/material highlighting recycled content information.
  - 2. Product Data sheets or other documentation for each product/material highlighting location of manufacture and harvest/extraction if within 500 miles of the project.

**1.3 QUALITY ASSURANCE**

- A. Regulatory Requirements: Comply with Authorities Having Jurisdiction and Americans with Disabilities Act (ADA) including ADA Accessibility Guidelines to accommodate barrier free design.

**1.4 FIELD SAMPLES**

- A. Provide field samples in accordance with Section 014000.
- B. Provide locker assembly of each type, complete with specified options and accessories.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.

**1.6 EXTRA STOCK MATERIALS**

- A. Provide touch-up paint for each color used.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Acceptable Wardrobe Locker Manufacturers:
  - 1. Vanguard Standard Lockers, Penco Products, Inc., Oaks, PA.
  - 2. Interior/Medart, Greenwood, MS.
  - 3. Lyon Metal Products, LLC, Aurora, IL.
  - 4. Republic Storage Systems Company, Inc., Canton, OH.

- B. Acceptable Ready Gear Lockers:
  - 1. Gear Grid, Mid-Minnesota Wire, Forest Lake, MN.
  - 2. Ready Rack
  - 3. No known equals.

## **2.2 METAL WARDROBE LOCKERS**

- A. Barrier Free Accessible Lockers: Provide 5 percent minimum of lockers for each sex with barrier free accessible features.
- B. Unit Size: Two Tier for a total height of 72 inches.
  - 1. Top Tier (Separate Small Linens Locker): 18 inches wide by 24 inches deep by 24 inches high.
  - 2. Bottom Tier: 18 inches wide by 24 inches deep by 60 inches tall
- C. Sheet Steel:
  - 1. Steel: ASTM A446, one-coat electroplated zinc cold rolled carbon steel.
  - 2. Surface: Free from buckle, scale, imperfections, and capable of taking high grade enamel finish.
  - 3. Minimum Gages:
    - a. Front frames and doors: 16 gage.
    - b. Body tops, bottoms, sides, backs, and shelves: 24 gage minimum, adequately flanged to provide rigidity.
    - c. Fillers, bases, exposed ends, trim: 20 gage minimum.
- D. Hardware:
  - 1. Locking and Latching Devices:
    - a. Classic III Multi-point latching with recessed handles complying with accessibility requirements.
    - b. Recess finger-lift control handle in door.
    - c. Pocket: 22 gauge brushed stainless steel securely fastened to door with two tabs and a positive tamper-resistant decorative fastener; of depth sufficient to prevent a combination padlock, built-in combination lock, or key lock from protruding beyond door face.
    - d. Provide lock hole cover plate for use with padlocks.
    - e. Attach 14 gauge formed steel lifting piece to latching channel with one concealed retaining lug and one rivet, assuring a positive two-point connection.
    - f. Handle finger lift: Molded, sound-deadening, attached with rivet; padlock eye for use with 9/32 inch diameter padlock shackle.
    - g. Latch Clip: Glass-filled nylon engaging the door frame and holding the door shut.
    - h. Doors 60 inches and 72 inches high: Three points.
    - i. Locking Device: Positive, automatic type, whereby locker may be locked when open, then closed without unlocking.
    - j. Firmly secure one rubber silencer in frame at each latch hook
  - 2. Hinges: Three on doors higher than 36 inches; 2 per door for 36 inches and shorter; 2 inch wide, 5 knuckle, tight pin, welded to frame and riveted to door.
- E. Accessories:
  - 1. Hooks: One double-prong ceiling hook and two single-prong wall hooks of cadmium-plated steel or cast aluminum for single and double tier units.
  - 2. Base: Zinc coated steel, manufacturer's standard color to match locker, recessed 'Z' style.
  - 3. Filler and boxed end panels: Manufacturer's standard.
  - 4. Number Plates: Aluminum with etched figures, 1/2 inch high minimum attached at top of door. Provide each locker with its own locker number.
  - 5. Hat Shelf: One per single tier units; hat shelf at 48-inches above floor at barrier free units..
  - 6. Coat rods: One per single tier units.
  - 7. Provide barrier free accessible lockers with applied decal next to latch showing universal symbol of accessibility.
  - 8. Provide barrier free accessible lockers with bottom shelf at 15 inches above finished floor.
- F. Fasteners: Cadmium, zinc, or nickel plated steel; no exposed bolts or rivet heads on front of lockers or frames.



- G. Fabrication:
  - 1. Frames: Totally welded overlapping construction, channel formed with double thickness lock and catch housing, and interlocked intermediate cross members.
  - 2. Doors: Self closing channel box formed with reinforced ends returned and welded with manufacturer's standard louver pattern.
  - 3. Body:
    - a. Flanged, reinforced.
    - b. Provide finished end panels for lockers with ends exposed to view.
- H. Finish: Manufacturer's baked enamel in color selected by Architect from manufacturer's full range of standard and optional colors.

## **2.3 READY GEAR LOCKERS**

- A. Type: Wall mounted and floor mounted configured wire storage system.
- B. Unit Sizes: Standard Size 20" wide x 20" deep x 72" tall.
- C. Frame: Heavy duty 1-1/4 inch tubing.
- D. Doors, Side, and Back Grids: High strength 1/4 inch cold-rolled wire, welded to a 3 inch square overall grid pattern for additional strength and stability.
- E. Power Bar: Provide manufacturer's standard bar along the top of the rows of lockers with one outlet per locker
- F. Shelves: High Strength 1/4 inch cold rolled wire. Adjustable in minimum 3 inch increments.
- 1. Provide 3 per locker
  - G. Heavy Duty Hooks – Three
  - H. Power strips – Over each locker
  - I. Name Plate: 20 gage cold-rolled sheet metal on the top shelf, accepts 2 x 6 inch custom printed tag.
  - J. Mounting Brackets: 11 gage cold-rolled steel.
  - K. Fabrication:
    - 1. Weld at applicable joints. Complete forming of metal by standard cold-forming operations.
    - 2. Fasteners are only allowed for knock down shipping, to secure units to mounting surface and on applicable accessories.
    - 3. Grid design to allow for ventilation and attachment of system accessories.
  - L. Factory Finish: Powder coat, color as indicated on Color and Material Schedule on Drawings.

## **2.4 BENCHES**

- A. Plastic Laminate Top:
  - 1. Laminated tops.
  - 2. Size: 1-1/4 inch thick by 9-1/2 inch wide, lengths as indicated typical; 24 inch wide by 48 inch long at barrier free accessible lockers.
- B. Moveable Bench Base:
  - 1. Pedestals: Stainless steel, free standing pedestal, 16-1/4" high. 14-inch wide base allowing for movable free standing use.
  - 2. Optional floor anchoring.
  - 3. Anchor bench top to base.

## **PART 3 - EXECUTION**

### **3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify recesses and bases are properly sized and located.

### **3.2 INSTALLATION**

- A. Install in accordance with Section 017300 and approved shop drawings.

- B. Install plumb, level, rigid, and flush.
- C. Space fastenings 48 inches OC maximum and apply through backup reinforcing plates where necessary to prevent metal distortion. Conceal fasteners wherever possible. Use anchorage devices appropriate to suit materials encountered.
- D. Bolt adjoining locker units together to provide rigid installation.
- E. Install box end panels, filler panels and other closures for complete installation and to close off openings.

### **3.3 ADJUSTING**

- A. Touch-up marred finishes.
- B. Use only materials and finishes recommended or furnished by locker manufacturer.
- C. Adjust doors and latches to operate easily without bind.

**END OF SECTION**

**SECTION 107114**  
**EXTERIOR ALUMINUM PERGOLA**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes: Complete pergola system including footings, structural items and pergola elements.
- B. Related Section:
  - 1. Section 033000 - Cast-in-Place Concrete.

**1.2 SYSTEM REQUIREMENTS**

- A. Design members to withstand wind loads in accordance with ASCE 710 and applicable code.
- B. Design foundations in accordance with applicable code and good construction practices for the specific structure and site conditions.
- C. Cooperate with regulatory agency or authority and provide data as requested.
- D. Design pergola for required allowable ground snow load in accordance with the applicable code.
- E. Design pergola in accordance with applicable fire code and provide data on ASTM E84 testing performance.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Provide manufacturer's specifications and descriptive literature on products proposed for use.
- C. Shop Drawings:
  - 1. Indicate general layout, dimensions, finishes, foundation and attachment system, jointing, anchorage and support conditions, and other accessories.
  - 2. Give detailed dimensions and locations and imposed loads.
- D. Samples: Two, 2 inch by 4 inch samples of actual finish selected on specified base material.
- E. Submit following Informational Submittals:
  - 1. Qualification data: Submit installer's qualifications verifying years of experience; include list of completed projects having similar scope of Work identified by name, location, date, reference names and phone numbers.
  - 2. Manufacturer's instructions: Detailed installation instructions of products proposed for use.
  - 3. Certification: Submit certification that pergola meets System Requirements.

**1.4 QUALITY ASSURANCE:**

- A. Manufacturer Qualifications: Single source manufacturer for design, engineering, structure prefabrication, and shipping.
- B. Installer Qualifications: Familiar with manufacturer's structures and installation techniques.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. All packages and pallets shall be opened and inspected for hidden damage upon receipt.
- C. Note missing or damaged components on delivery receipt with carrier before accepting shipment.
- D. Repackage components and carefully store in area protected from weather until ready for installation.
- E. Handle components to protect materials, coatings, and finishes during transportation and installation to prevent damage or staining.

**1.6 SEQUENCING**

- A. Ensure that footing location plans and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.
- B. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

**1.7 WARRANTY**

- A. Provide manufacturer's warranties, as appropriate, for all pergola components, canopy systems, and finish coatings.
  - 1. 30 Year commercial warranty on aluminum pergolas.
  - 2. 20 year warranty on finish.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Acceptable Manufacturers:
  - 1. Acceptable Manufacturer: Structureworks, 3300 Dill Smith Dr.; Fredericksburg, VA 22408  
Phone: 877.489.8064 Fax: 877.489.2009 Email: [info@structureworksfab.com](mailto:info@structureworksfab.com), Website: [www.structureworksfab.com](http://www.structureworksfab.com).

**2.2 COMPONENTS AND ACCESSORIES**

- A. Pergola Design: Freestanding; refer to Drawings for component sizes and profiles.
- B. Components: Aluminum for posts, beams, rafters, and stringers.
- C. Hardware: Exposed hardware to be stainless steel or aluminum.
- D. Concrete for Foundation: Refer to Section 033000.

**2.3 FINISHES**

- A. Metal Surfaces in Contact with Concrete: Asphaltic or coal-tar coating of type recommended by manufacturer.
- B. Provide pergola components (posts, beams, rafters, and stringers) with manufacturer's standard ColorLast Process finish coating applied.
- C. Color as selected by Architect.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify that concrete foundation is ready to receive work and dimensions are as instructed by manufacturer.
- C. Beginning of installation means acceptance of existing conditions.

**3.2 PREPARATION**

- A. Clean component surfaces thoroughly prior to installation.

**3.3 INSTALLATION**

- A. Install in accordance with Section 017300 and approved shop drawings.
- B. Construct foundations in accordance with local codes and good construction practices for the specific structure and site conditions.
- C. Surface Mount on New Footings: Surface mount units on new concrete footings as indicated in the on the approved shop drawings.
- D. Anchor bolts for surface mounted units shall be accurately set using manufacturer's instructions.

**3.4 CLEANING**

- A. Clean surfaces and restore any marred surfaces to original conditions as approved by Architect.

**3.5 PROTECTION**

- A. Protect installed products until completion of project.
- B. Touchup, repair, or replace damaged products before Substantial Completion

**END OF SECTION**



**SECTION 107500**  
**FLAGPOLES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Related Sections:
  - 1. Section 033000 - Cast-in-Place Concrete.

**1.2 SYSTEM REQUIREMENTS**

- A. System Description:
  - 1. Type: Ground mounted.
  - 2. Pole Design: Cone tapered.
  - 3. Flags: Accommodate 1 flag each pole. Flags will be by Owner
  - 4. Exposed Heights:
    - a. Quantity - 1: 30 feet measured from top of base
    - b. Quantity - 2: 25 feet measured from top of base
  - 5. Halyard: External.
- B. Structural Requirements: Design flagpoles, bases and anchorage devices to resist without permanent deformation, 90 mph wind velocity, non-resonant, in unflagged condition.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Provide manufacturer's specifications and descriptive literature on products proposed for use.
- C. Shop Drawings:
  - 1. Indicate general layout, dimensions, finishes, foundation and base system, jointing, anchorage and support conditions, cleats, halyard boxes, trucks, finals, base collar other accessories.
  - 2. Give detailed dimensions and locations and imposed loads.
- D. Samples: Two, 2 inch by 4 inch samples of actual finish selected on specified base material.
- E. Submit following Informational Submittals:
  - 1. Qualification data: Submit installer's qualifications verifying years of experience; include list of completed projects having similar scope of Work identified by name, location, date, reference names and phone numbers.
  - 2. Manufacturer's instructions: Detailed installation instructions of products proposed for use.
  - 3. Certification: Submit certification that flagpoles, bases and anchorage devices are capable of resisting, without permanent deformation, 90 mph wind velocity, non-resonant, in unflagged condition.
- F. Closeout Submittals: Operation Data; operating instructions for halyard system.

**1.4 QUALITY ASSURANCE:**

- A. Installer Qualifications: Experienced in this type of installation with minimum 3 years experience successfully installing similar systems.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.
- C. Protect products on site from damage and moisture.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Acceptable Manufacturers:
  - 1. American Flagpole, Abingdon, VA.
  - 2. Concord Industries, Inc., Addison, TX.
  - 3. John Ewing and Company, Inc., Buffalo, NY.

**2.2 MATERIALS**

- A. Aluminum: Seamless extruded tubing, ASTM B241; 6063 alloy, T6 temper.

**2.3 COMPONENTS AND ACCESSORIES**

- A. Finials: Custom each flag.
  - 1. National Flag: Eagle.
  - 2. State Flag: Ball ornament
  - 3. County Flag: Botonee cross
- B. Truck Assembly: Cast aluminum; revolving type with stainless steel ball-bearings, non-fouling, waterproof.
- C. Cleats: Manufacturer's standard length in aluminum with stainless steel fastenings, two per halyard.
- D. Cleat Box: Aluminum, with built-in hinge and hasp assembly, attached to pole with tamperproof screws inside box.
- E. Halyard:
  - 1. Manufacturer's standard diameter polypropylene, braided, white.
  - 2. Provide 1 halyard and cleat per pole.
- F. Connecting Sleeves for Multiple Section Poles: Same material as pole, precision fit for field assembly of pole, concealed fasteners.
- G. Concrete: Refer to Section 033000.
- H. Sand: Dry masonry sand.

**2.4 MOUNTING ASSEMBLIES**

- A. Ground Set Foundation Assembly:
  - 1. Foundation Tube Sleeve: AASHTO M-36, corrugated 16 gage steel, galvanized, depth as recommended by manufacturer for pole heights indicated.
  - 2. Flashing Collar/Base: Cast aluminum material of manufacturer's standard profile, of size to accommodate butt diameter of flagpole.
  - 3. Centering Wedges: Four internal steel wedges, welded to support plate and foundation sleeve for centering of flagpole.
  - 4. Ground Spike: 3/4 inch diameter steel spike, 18 inches minimum length; welded to foundation sleeve plate.
  - 5. Foundation Base Plate: 1/4 inch thick steel, 4 inches larger than inside diameter of ground sleeve, welded to ground spike.
  - 6. Setting Plate: 6 inch square welded to ground spike at least 6 inch below base plate at bottom of concrete foundation.

**2.5 FABRICATION**

- A. Cone tapered:
  - 1. Seamless, uniform, straight line tapered section above cylindrical butt section.
  - 2. Taper: Full length of run at approximately 1 inch per 5.5 feet of length.
  - 3. Provide internal splicing, self-aligned sleeve of same material as flagpole for snug fitting, precision field joints.



**2.6 FINISHES**

- A. Metal Surfaces in Contact with Concrete or Sand: Asphaltic or coal-tar coating of type recommended by manufacturer.
- B. Concealed Steel Surfaces: Galvanized to 1.25 ounce per square feet.
- C. Aluminum: Anodized to 0.7 mil thickness in clear color.
- D. Finish on accessory items to match that of pole.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Verify that concrete foundation supports are ready to receive work and dimensions are as instructed by manufacturer.
- C. Beginning of installation means acceptance of existing conditions.

**3.2 PREPARATION**

- A. Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with asphaltic paint.

**3.3 INSTALLATION**

- A. Install in accordance with Section 017300 and approved shop drawings.
- B. Ground Set Poles:
  - 1. Excavation: Excavate for foundation concrete to neat clean lines in undisturbed soil. Provide forms where required due to unstable soil conditions. Remove wood, loose soil, rubbish and other foreign matter from excavation, and moisten earth before placing concrete.
  - 2. Refer to Section 033000 for concrete mix and placing procedures. Trowel exposed surfaces to smooth dense finish with positive slope away from pole base.
  - 3. Install foundation sleeve/plate and centering wedges for flagpoles base set in concrete foundation. Fill foundation tube sleeve with sand and compact after plumbing pole.
  - 4. Apply sealant on top 1/2 inch of foundation sleeve.

**3.4 TOLERANCES**

- A. Maximum Variation From Plumb: 1 inch.

**3.5 ADJUSTING AND CLEANING**

- A. Clean surfaces.
- B. Adjust operating devices so that halyards function smoothly.

**END OF SECTION**



**SECTION 113100**  
**APPLIANCES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Related Sections:
  - 1. Division 22 - Plumbing: Piping rough-in.
  - 2. Division 26 - Electrical: Power rough-in.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  - 1. Submit product data for appliances.
  - 2. Submit color charts for finish indicating manufacturer's colors available for selection.
- C. Submit following Informational Submittals:
  - 1. Qualification Data: Manufacturer's and installer's qualification data.
  - 2. Manufacturer's instructions.
- D. Closeout Submittals:
  - 1. Submit under provisions of Section 017700.
  - 2. Operation and maintenance data.
  - 3. Warranty: Submit specified warranty.

**1.3 QUALITY ASSURANCE**

- A. Single Source Responsibility: Each item of equipment specified by generic type is required to be from one manufacturer.
- B. Manufacturer Qualifications: Company specializing in manufacturing Products specified in this Section with minimum 5 years documented experience.
- C. Installer Qualifications: Acceptable to manufacturer with documented experience on at least 5 projects of similar nature in past 5 years.
- D. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Do not deliver to Project until installation area is fully enclosed and protected from weather and theft.

**1.5 WARRANTY**

- A. Comply with provisions of Section 017700.
- B. Manufacturer's full one year warranty for parts and labor to repair appliance that fails.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Acceptable Manufacturers:
  - 1. Amana Refrigeration, Inc., Amana, IA.
  - 2. GE Appliances, Louisville, KY.
  - 3. Hotpoint, Louisville, KY.
  - 4. KitchenAid, Benton Harbor, MI.
  - 5. Whirlpool Corporation, Benton Harbor, MI.

**2.2 APPLIANCES**

- A. Appliances: Basis of Design Products and Manufacturers are specified in the Equipment Schedule on the Drawings. Items of equivalent design, sight lines, construction, size, function and capacity by other manufacturers listed in this Section, are also acceptable.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Examine appliances thoroughly upon removal from packing crates and protective wrappings upon arrival at site.
- C. Verify that accessories necessary for complete installation have been included with appliance.
- D. Examine installation area to ensure rough-in requirements have been met and area is ready to receive each appliance.

**3.2 PREPARATION**

- A. Ensure that appliances are fully assembled and ready for installation in final location.
- B. Verify that clearances at final location are adequate for proper functioning and operation of equipment.

**3.3 INSTALLATION**

- A. Install in accordance with Section 017300 and recommendations.
- B. Connect utilities to installed equipment items complying with manufacturer's instructions.
- C. Anchor components plumb and level, secured for long life under hard use. Align where necessary with adjacent cabinets, equipment and surfaces.

**3.4 ADJUSTING**

- A. Adjust appliances to ensure smooth, quiet, trouble-free operation.

**3.5 CLEANING**

- A. Ensure appliances are wiped clean prior to final acceptance.

**3.6 DEMONSTRATION**

- A. Perform in accordance with Section 017300.
- B. Provide test demonstration to Owner to ensure proper control and operation of appliance.

**END OF SECTION**

**SECTION 115213**  
**PROJECTION SCREEN**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes: Electric operated projection screen mounted below ceiling on fixed hanging brackets.
- B. Related Sections:
  - 1. Section 061053 - Rough Carpentry: Substrate support.
  - 2. Division 26 - Electrical: Building power system.

**1.2 SYSTEM REQUIREMENTS**

- A. Screen Performance Requirements:
  - 1. Matte-White Viewing Surface: Peak gain of 0.9 to 1.0, and gain of not less than 0.8 at an angle of 50 degrees from the axis of the screen surface.
  - 2. Mildew Resistance: Rating of 0 or 1 when tested according to ASTM G 21.
  - 3. Flame Resistance: Passes NFPA 701.
  - 4. Flame-Spread Index: Not greater than 75 when tested according to ASTM E 84.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit product data for projection screens.
- C. Shop Drawings:
  - 1. Submit shop drawings of details indicating structural substrate required for mounting housing brackets.
  - 2. Include identification and ratings of components, details of construction and materials.
  - 3. Indicate integration of screen with adjacent surfaces.
  - 4. Include wiring diagram and identification of wiring terminals for electrically-operated units.
- D. Samples: 12 by 12 inch pieces of projection screen material for approval prior to order.
- E. Submit following Informational Submittals:
  - 1. Certifications specified in Quality Assurance article.
  - 2. Qualification Data: Manufacturer's and installer's qualification data.
  - 3. Manufacturer's instructions.
  - 4. Manufacturer's field reports.
- F. Closeout Submittals:
  - 1. Submit under provisions of Section 017700.
  - 2. Operation and maintenance data.
  - 3. Warranty: Submit specified warranty.

**1.4 QUALITY ASSURANCE**

- A. Single Source Responsibility: Obtain each type projection screen from single manufacturer, including accompanying accessories necessary for mounting and operation.
- B. Manufacturer Qualifications: Minimum 5 years experience in production of projection screens specified.
- C. Installer Qualifications: Approved in writing by manufacturer.
- D. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

**1.5 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Do not deliver projection screens until building is enclosed, work on screen area is substantially complete and screen installation ready to occur.

**PART 2 - PRODUCTS****2.1 ELECTRICALLY OPERATED PROJECTION SCREENS**

- A. Type: Mounted below ceiling.
- B. Operation:
  - 1. Manufacturer's standard UL Listed and marked units.
  - 2. Accessible electric motor, 120 VAC 60 Hz, size and capacity for screen size.
  - 3. Instantly reversible, with lifetime lubrication.
  - 4. Limit switches, positive stop action to prevent coasting, and thermal overload protection.
  - 5. Motor-in-roller.
  - 6. Slot in case bottom.
- C. Screen Controls:
  - 1. Single station, 3 position, UL listed switch with metal device box and cover plate, 120 VAC.
- D. Screen: Matte white, flame and mildew resistant.
- E. Screen Size: 84 inches by 96 inches.
- F. Edge Treatment: 2 inch black masking border. Provide 12 inch black "extra drop".
- G. Screen Case:
  - 1. Metal lined motor compartment.
  - 2. Piano hinged closure, automatic with drive mechanism.
  - 3. Bottom panel access and manual opening.
  - 4. Mounting brackets as required for installation.
- H. Seam Location: Top.
- I. Screen Installation: Mounted below ceiling.
- J. Acceptable Manufacturers:
  - 1. Draper Shade and Screen Company, Inc., Spiceland, IN.
  - 2. Da-Lite Screen Company, Inc., Warsaw, IN.
  - 3. Bretford Manufacturing, Inc., Franklin Park, IL.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions and proceed with Work in accordance with Section 017300.
- B. Ensure construction, painting, finishing and clean-up is substantially complete in area of installation to avoid damage to optical surface.

**3.2 PREPARATION**

- A. Obtain or determine finish ceiling elevations for locating screens at proper heights.

**3.3 INSTALLATION**

- A. Install in accordance with Section 017300.
- B. Install projection screens in spaces indicated.
- C. Secure mounting brackets to structure with approved fasteners.
- D. Install recessed projection screens prior to installation of ceiling.

**3.4 ADJUSTING**

- A. Upon completion, screens are required to operate freely and hang plumb and square.

**3.5 CLEANING**

- A. Do not use solvents or abrasive cleaners of any type.
- B. Clean only with mild soapy water and soft lint-free cloths.
- C. Blot dry to remove excess moisture.

**3.6 PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. Protect projection screens from damage or defacement until final completion and acceptance of the project by the Owner.
- C. Replace damaged units prior to final completion at no additional cost to Owner.

**3.7 DEMONSTRATION**

- A. Arrange to demonstrate system to Owner's representative at time mutually agreeable.
- B. Manufacturer's representative shall also instruct Owner's designated personnel in complete operation and maintenance of installed system.

**END OF SECTION**





**SECTION 119410**  
**HOSE REELS**

**PART 1 - GENERAL****1.1 DEFINITIONS**

- A. Scope: Provide Air, Water and Electrical Reels in quantities and locations as shown on the Drawings. Coordinate with the electrical and plumbing work for these items.

**1.2 SUBMITTALS**

- A. Product Data:
  - 1. Furnish manufacturer's descriptive literature.
  - 2. Include physical dimensions, operational features, color and finish, anchorage and support details, material descriptions, and type of hardware.

**1.3 PROJECT CONDITIONS**

- A. Environmental Requirements: Do not store products subject to freeze damage in environments where damage could occur.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS**

- A. Basis of Design Manufacturers:
  - 1. Air Hose Reel: Grainger 4na85
  - 2. Water Hose Reel: Grainger 2pay8
  - 3. Electrical Reel: Grainger 2xjd3
    - a. Electric Reel spec to include Hubbell 5020 R Female straight blade (Part # HBL 5369C) and Hubbell 5020R Male straight blade (Part #HBL 5266C) plugs.

**2.2 AIR HOSE REEL**

- A. Provide a wall and ceiling mounted air hose reels at locations as shown on the drawings.
- B. Contractor shall provide the necessary secondary structure to have the reel from the structure so the reel can be hung below the ceiling.
- C. Air hose reel shall be self retracting.
- D. Provide a 75 foot; ½ inch compressed air hose with a ball stop.

**2.3 WATER HOSE REELS**

- A. Provide a wall mounted water hose reel as located on the drawings.
- B. Water hose reel shall be self retracting.
- C. Provide a 75 foot, 1 inch hose with a ball stop – terminate the hose with a male end.

**2.4 ELECTRIC CORD HOSE REELS**

- A. Provide ceiling and wall mounted electric cord reels.
- B. Contractor shall provide the necessary secondary structure to hang the reel from the structure so the reel can be hung below the ceiling.
- C. Electric cord reel shall be self retracting.
- D. Provide a 25 foot 12 AWG cord with a ball stop.
- E. Terminate the line with a NEMA 6-20 R quick release receptacle.

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine conditions and proceed with Work.

**3.2 INSTALLATION**

- A. Install in accordance with manufacturer's printed instructions.
- B. Install reels plumb and level at locations indicated on Drawings.
- C. Securely attach reels and mounting brackets to wall or over head support system.

**END OF SECTION**

**SECTION 119420**  
**SCBA COMPRESSOR**

**PART 1 - GENERAL**

**1.1 SCOPE**

- A. Work shall include: compressor, filters, fill stations, control panel, storage tank piping, power, and all accessories required for a complete and operational system.

**1.2 SUBMITTALS**

- A. Product Data:
1. Furnish manufacturer's descriptive literature.
  2. Include physical dimensions, operational features, color and finish, anchorage details, material descriptions, and type of piping.
- B. Shop Drawings: Include rough-in measurements, locations, and details for cabinets.
- C. Submit following Informational Submittals:
1. Certificates: Submit certification attesting compliance with NFPA requirements.
  2. Manufacturer's instructions: Submit installation instructions for SCBA compressor, storage tank and fill stations.

**1.3 QUALITY ASSURANCE**

- A. Single Source Responsibility: Obtain products in this Section from one manufacturer.

**1.4 PROJECT CONDITIONS**

- A. Environmental Requirements: Do not store products subject to freeze damage in environments where damage could occur.

**1.5 WARRANTY**

- A. The station shall be warranted free from defects in material and workmanship for a period of twelve months from date of substantial completion. The warranty shall not impose limitations on the station's accumulated operating hours during the warranty period.

**1.6 START-UP AND DEMONSTRATION**

- A. The Manufacturer's Representative shall review the final installation and provide two hours of training to the Owner.

**PART 2 - PRODUCTS**

**2.1 MANUFACTURERS**

- A. Basis of Design: Scott Hush Air Compressor (AC050543111) and Scott Revolve Air Fill Station (AF 21122220001), and 4-600 PSI Cylinders (AB15-6600-C4).
1. Compressor: 20 HP 4 Stage 6000 PSI

**PART 3 - EXECUTION**

**3.1 EXAMINATION**

- A. Examine conditions and proceed with Work.

**3.2 INSTALLATION**

- A. Install in accordance with manufacturer's printed instructions.
- B. Securely attach cabinets and mounting brackets in place to wall blocking.

**END OF SECTION**



**SECTION 122113**  
**HORIZONTAL LOUVER BLINDS**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Related Sections:
  - 1. Section 061053 - Miscellaneous Rough Carpentry: Wood blocking.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  - 1. Submit product data for horizontal louver blinds.
- C. Shop Drawings:
  - 1. Submit shop drawings for horizontal louver blinds.
  - 2. Indicate typical layout including dimensions, total stack height, and location of lift and tilt controls.
  - 3. Submit detail drawings of special accessory components not included in manufacturer's product data.
  - 4. Submit detail drawings of head and sill conditions for each type of opening and supporting structure, and conditions between adjacent blind units.
- D. Samples:
  - 1. Submit 2 sets of slat material samples indicating manufacturer's full color range for selection by Architect.
  - 2. Submit three 6 inch samples of cord, tassel, and ladder material in specified color indicating variation in color.
- E. Submit following Informational Submittals:
  - 1. Qualification Data: Installer's qualification data.
  - 2. Manufacturer's instructions.
- F. Closeout Submittals:
  - 1. Submit under provisions of Section 017700.
  - 2. Operation and Maintenance data: Submit manufacturer's printed, recommended operation and maintenance data.
  - 3. Warranty: Submit specified product warranty.

**1.3 QUALITY ASSURANCE**

- A. Single Source Responsibility:
  - 1. Furnish blind units from one manufacturer for entire Project, unless otherwise acceptable to Architect.
  - 2. Provide each blind as complete unit, including hardware, mounting brackets, fasteners, and accessory items.
- B. Installer's Qualifications: Acceptable to blind manufacturer.
- C. Regulatory Requirements: Ensure plastic components comply with applicable portions of local, state, and federal codes, laws, and ordinances for flame and smoke indices.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of section 016000.
- B. Deliver blinds to site wrapped and packaged to prevent damage to components and marring of surfaces.
- C. Store blinds in clean, dry area, laid flat and off ground to prevent sagging, twisting, or warping.
- D. Safeguard against damage by physical abuse or damage from harmful materials.

**1.5 WARRANTY**

- A. Comply with provisions of Section 017700.
- B. Warrant installed blind units to be free from defects in material and workmanship for a period of 3 years.
- C. Warrant applied finishes to maintain gloss and resist peeling, fading, and chalking for a period of 3 years.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products:
  - 1. Springs Window Fashions, Inc., (Bali-Graber Contract), Montgomery, PA.
    - a. 1 inch mini-blinds: Bali Classics.
  - 2. Hunter Douglas Window Fashions, Saddle River, NJ.
    - a. 1 inch mini-blinds: Celebrity Line.
  - 3. Kirsch Company, Sturgis, MI.
    - a. 1 inch mini-blinds: Medallion Plus Series.
  - 4. Levolor Home Fashions - Contract, High Point, NC.
    - a. 1 inch mini-blinds: Riviera Series.

**2.2 MATERIALS AND COMPONENTS**

- A. Head Rail: U shaped; minimum 1 inch high by 1-1/2 inch wide by 0.023 inch thick roll-formed steel.
- B. Bottom Rail: Tubular oval shaped; minimum 1/2 inch high by 1 inch wide by 0.014 inch thick roll-formed steel.
- C. Aluminum Slats: 1 inch wide; minimum 0.008 inch thick spring tempered aluminum.
- D. Ladders: 0.045 to 0.070 inch vertical component of braided polyester yarn; minimum two threads in horizontal rungs, inter-braided with verticals.
- E. Lift Cord: Nominal braided polyester cord with reinforced core extended through each slat and interwoven between ladder rungs; minimum 140 pound tensile strength.
- F. Cord Lock: Stainless steel wear guard shafts with cord separators over which lift cords pass and floating shaft-type locking pin with non-abrasive teeth. Incorporate crash-proof safety feature to lock blind automatically upon sudden release of cords.
- G. Tilt Mechanism:
  - 1. Tilt rod: Hexagonal or U shaped continuous steel rod; 1/4 inch average cross section.
  - 2. Ladder drum: Minimum 0.028 inch thick steel with rolled edged holes to anchor ladder ends.
  - 3. Ladder cradle: Minimum 0.042 inch thick steel with rolled edged holes to guide lift cords through bottom of head rail without abrasion.
  - 4. Tilter shaft link: Self lubricating, corrosion resistant worm gears encased in totally enclosed gear housing. Fitted with hook to receive wand.
  - 5. Tilt wand: Transparent multisided plastic rod, nominal 5/16 inch average cross section.
- H. Accessories:
  - 1. End Support Brackets: Minimum 0.038 inch thick steel, designed to support and close ends of head rail; finish to match head rail.
  - 2. Intermediate Support Brackets: Minimum 0.038 inch thick steel, designed to support head rail without overlapping onto face of rail; finish to match head rail.
  - 3. Bottom Rail End Caps: Molded thermoplastic caps with ribs to hold rail off sill to prevent scratching; provide with hold-down pins to close ends of bottom rail; finish to match slats.
  - 4. Hold Down Brackets: Roll formed steel, wall mounting brackets with 2 punched fastener holes; finish to match slats.
  - 5. Cord Equalizers: Removable, sliding plastic cord binding devices; color to match cords.
  - 6. Lift Cord Ends: 1-1/4 inch diameter, chrome plated, welded steel rings.
  - 7. Provide other materials necessary for complete and proper installation and operation.

**2.3 FABRICATION**

- A. Prior to fabrication, field measure actual opening dimensions to ensure proper fit.
- B. Fabricate units for between mullion (inside) mounting to completely fill openings from head to sill and mullion to mullion.
- C. Fabricate blinds in longest possible lengths. Locate ends of adjacent blind units at window mullions or other defined vertical separations where single length blinds are not practical.
- D. Fabricate head rail to enclose lift and tilt, cord lock, and ladder drum and cradle mechanisms with control location capable of being located at either end or at opposite ends of head rail.
- E. Fabricate bottom rails with top surface contoured to match slat curvature, and with flat or curved bottom.
- F. Fabricate aluminum slats with rounded corners and with edges smooth and free of burrs. Form slats to elliptical crowned profile. Rout slats to receive lift cords threaded through slats.
- G. Locate ladders within 7 inches of slat ends and at maximum 24 inch intermediate spacing. Fabricate ladders as required to space slats uniformly and to provide proper overlap when closed.
- H. Locate lift cords at each end and at maximum 48 inch intermediate spacing.
- I. Fabricate lift lock mechanism to allow unlimited positioning of blinds from fully closed to fully open.
- J. Fabricate lift cords to lengths required to prevent cords from lying on floor with blinds fully open.
- K. Fabricate tilt mechanism to rotate and hold slats at any angle and to disengage gears to eliminate overdrive and to prevent strain or damage to blind.
- L. Locate lift and tilt controls on opposite ends of each unit, confirm locations on approved shop drawings.

**2.4 FINISHES**

- A. Head and Bottom Rail Finish: Color as selected by Architect from samples submitted.
- B. Slats: As selected by Architect from samples submitted.
- C. Ladders: Single color to match slats.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Verify that openings in which blinds will be installed are free of conditions that might interfere with blind installation or operation.

**3.2 INSTALLATION**

- A. Install in accordance with approved shop drawings.
- B. Install units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.
- C. Install brackets at ends and at intermediate intervals required to prevent head rail deflection.
- D. Install blinds with adequate clearance to permit smooth operation of blinds and sash operators.
- E. Maintain 1/4 inch clearance from each side of window openings on inside mounting conditions and 1/4 inch between adjacent blind units unless other clearance is indicated on approved shop drawings.

**3.3 ADJUSTING**

- A. Adjust parts for smooth, uniform operation.

**3.4 CLEANING**

- A. Wipe surfaces with clean damp cloth as recommended by manufacturer. Do not use steam, hot water, bleach, or abrasive or solvent based cleaners.

**3.5 PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. Raise installed blinds to fully open position to avoid damage and accumulation of dust and dirt until Final Completion.

**END OF SECTION**



**SECTION 122413**  
**ROLLING WINDOW SHADES**

**PART 1 - GENERAL**

**1.1 SUMMARY**

- A. Section Includes: Black out shades with side channels for use in Training Room.
  - 1. Section 012300 – Alternates.
  - 2. Section 061000 - Rough Carpentry: Wood blocking.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  - 1. Submit product data for rolling shades.
  - 2. Include data to indicate shading coefficient, and thermal transmittance/reflectance properties.
- C. Shop Drawings:
  - 1. Submit shop drawings for rolling shades.
  - 2. Indicate typical layout including dimensions, and location of controls.
  - 3. Submit detail drawings of special accessory components not included in manufacturer's product data.
  - 4. Submit detail drawings of head, jamb, and sill conditions for each type of opening and supporting structure, and conditions between adjacent shade units.
  - 5. Submit drawings showing field measured dimensions of openings scheduled to receive shades.
- D. Samples: Submit 2 sets of shade material samples indicating manufacturer's full range of colors and fabrics for selection by Architect.
- E. Informational Submittals: Submit the following:
  - 1. Qualification Data: Installer's qualification data.
  - 2. Manufacturer's instructions.
- F. Closeout Submittals:
  - 1. Submit under provisions of Section 017300.
  - 2. Operation and Maintenance Data: Submit manufacturer's printed, recommended operation and maintenance data.
  - 3. Warranty: Submit specified warranty.

**1.3 QUALITY ASSURANCE**

- A. Single Source Responsibility:
  - 1. Furnish shade units from one manufacturer for entire Project, unless otherwise acceptable to Architect.
  - 2. Provide each shade as complete unit, including hardware, mounting brackets, fasteners, and accessory items.
- B. Installer's Qualifications: Acceptable to manufacturer.
- C. Regulatory Requirements: Ensure fabrics and plastic components comply with applicable portions of local, state, and federal codes, laws, and ordinances for flame spread and smoke development indices.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Deliver shades to site wrapped and packaged to prevent damage to components and marring of surfaces.
- C. Store shades in clean, dry area, laid flat and off ground to prevent sagging, twisting, or warping.
- D. Safeguard against damage by physical abuse or damage from harmful materials.

**1.5 WARRANTY**

- A. Comply with provisions of Section 017800.
- B. Warrant installed shade units to be free from defects in material and workmanship for a period of 3 years.
- C. Warrant applied finishes to maintain gloss and resist peeling, fading, and chalking for a period of 3 years.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Manufacturers and Products:
  - 1. Castec Window Shading, Inc., North Hollywood, CA.: Rollstar Series - Manual Operation.
  - 2. Draper Shade and Screen Company, Inc., Spiceland, IN.:
    - a. FlexShade System - Manual Operation.
    - b. Lite-Lock System - Manual Operation.
  - 3. Basis of Design: MechoShade Systems, Inc., Long Island City, NY.:
    - a. Mecho Shade Series - Manual Operation.
  - 4. Sol-R-Veil, Bronx, NY.:
    - a. Sure Shade Manual System.

**2.2 MATERIALS AND COMPONENTS**

- A. Drive Roller Tube: Round tube with asymmetrical channels to receive shade spline; minimum 1-3/8 inch outside diameter by 0.090 inch thick extruded 6063 alloy, T6 temper aluminum.
- B. Black-Out Shade Fabric: Double layer cotton web with rubber coated center sheet; color as selected by Architect from samples submitted.
- C. Manual Drive Mechanism:
  - 1. Operator: Smooth operating chain and sprocket drive with concealed, adjustable, bi-directional slip clutch that will allow shade to stop in any position.
  - 2. Limit Controls: Provide upper and lower stop limits to prevent over winding and to allow air flow at sill.
- D. Jamb and Sill Channels: Channel shaped extruded aluminum with pile brush inserts to ensure complete light seal to shade.
- E. Recessed Ceiling Pocket: Minimum 26 gage sheet steel or aluminum.
- F. Accessories:
  - 1. Bottom Bar: Minimum 3/8 by 1 inch extruded aluminum bar with spline channel for shade attachment.
  - 2. Mounting Brackets: Sheet steel brackets to receive drive end and idle end roller caps. Include hardware necessary to securely attach brackets to supporting construction and to support weight of shades plus forces applied to operate shades.
  - 3. Control chain: Continuous No. 10 nickel plated brass bead chain.
  - 4. Provide other materials necessary for complete and proper installation and operation.

**2.3 FABRICATION**

- A. Prior to fabrication, field measure actual opening dimensions to ensure proper fit.
- B. Fabricate units for face-of-wall (outside) pocket mounting to completely fill openings from head to sill and from centerline to centerline of mullions.
- C. Fabricate roller tube with controls capable of being located at either end of tube.
- D. Fabricate shade fabric with top edge attached to removable spline designed to lock into roller tube. Fabricate bottom edge with concealed bottom bar sewn in hem. Hem, heat-set or otherwise treat edges of fabric to prevent raveling.
- E. Adjust limit controls to allow infinite positioning of shades from fully closed to fully open.
- F. Locate operating controls on indicated end of each shade.

**2.4 FINISHES**

- A. Exposed Aluminum Finish: As selected by Architect from samples submitted.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Verify that openings in which shades will be installed are free of conditions that might interfere with shade installation or operation.

**3.2 INSTALLATION**

- A. Install in accordance with Section 017300 and approved shop drawings.
- B. Install units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.
- C. Install shades with adequate clearance to permit smooth operation of shades and sash operators.
- D. Install jamb and sill channels flush and in line with shade travel path. Seal to surrounding surfaces as required to prevent light seepage.

**3.3 ADJUSTING**

- A. Adjust parts for smooth, uniform operation.
- B. Adjust preset limit stops as directed by Architect.

**3.4 CLEANING**

- A. Wipe surfaces with clean damp cloth as recommended by manufacturer. Do not use steam, hot water, bleach, or abrasive or solvent based cleaners.

**3.5 PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. Store installed shades in fully retracted position to avoid damage and accumulation of dust and dirt until Final Completion.

**END OF SECTION**



**SECTION 123663**  
**SOLID SURFACING FABRICATIONS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Related Sections:
  - 1. Section 064116 – Plastic Laminate Clad Wood Cabinets.
  - 2. Division 22 – Plumbing.
- B. This Project is a registered US Green Building Council “LEED” project.
  - 1. Select locally or regionally fabricated products wherever possible.
  - 2. Provide materials certified by GreenGuard as “low-emitting” materials.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data:
  - 1. Submit product data indicating physical properties and performance criteria for sheet materials and related components.
  - 2. Submit color charts for finish indicating manufacturer's colors available for selection.
- C. Shop Drawings:
  - 1. Submit shop drawings indicating materials, dimensions, fabrication details, jointing methods, anchorages, and attachment provisions.
  - 2. Show integral sink bowl size, depth, and cutouts for fixtures.
- D. Samples: Submit 6 by 6 inch in size illustrating color, pattern, and edge treatment each solid polymer.
- E. Submit following Informational Submittals:
  - 1. Certifications specified in Quality Assurance article.
  - 2. Qualification Data: Fabricator's and installer's qualification data.
- F. Closeout Submittals:
  - 1. Submit under provisions of Section 017700.
  - 2. Maintenance data.
- G. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Countertops.
  - 2. LEED Credit EQc4.1: Provide “GreenGuard” countertop VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer's literature. Provide the product manufacturer's most current VOC emissions data:
    - a. Countertops.

**1.3 QUALITY ASSURANCE**

- A. Single Source Responsibility: Furnish each unit from one manufacturer, unless otherwise acceptable to Architect.
- B. Fabricator Qualifications: Company specializing in fabricating work specified in this Section with minimum 5 years experience.
- C. Certifications: Submit manufacturer's certification that products furnished for Project meet or exceed specified requirements.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of Section 016000.
- B. Provide protective coverings of suitable material. Take special precautions at corners.

**1.5 WARRANTY**

- A. Comply with provisions of Section 017700.
- B. Furnish warranty against defects in material for 10 years. Include material and labor to repair or replace defective materials.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Product: Refer to Color and Material Schedule on Drawings.

**2.2 MATERIALS**

- A. Solid polymer sheets in accordance with ANSI Z124.
- B. Physical Properties:
  - 1. Tensile Strength: 3900 psi, ASTM D638.
  - 2. Tensile Modulus:  $5 \times 10^5$  psi, ASTM D638.
  - 3. Hardness: 90 Rockwell "M" scale or 56 Barcol Impressor, minimum.
  - 4. Water Absorption: 3/4 inch material 24 hours, 0.08 percent by weight, ASTM D570.
  - 5. Izod Impact: 0.242 lbf ft/in. of notch, Method A, ASTM D256.
  - 6. Impact Resistance: No fracture, NEMA LD3
    - a. 1/4 inch slab, 36 inch drop, 1/2 pound ball
    - b. 1/2 inch slab, 36 inch drop, 1 pound ball
    - c. 3/4 inch slab, 36 inch drop, 2 pound ball.

**2.3 ACCESSORIES**

- A. Mastic: Type recommended by manufacturer.
- B. Seam Adhesive: Type recommended by manufacturer; color to blend with sheet material.
- C. Grommets:
  - 1. General: 3 inch hole, black.
  - 2. Provide covers.
  - 3. Products and Manufacturers: Model XG by Doug Mockett and Company, Inc.
- D. Adhesives & Sealants: Only use adhesives and sealants that comply with VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168 on the interior of the building.
  - 1. Current requirement refers to the date on which the materials are installed in the building.
  - 2. SCAQMD Rule #1168 referenced in Section 018113 that was current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
  - 3. Interior refers to all building construction that is inside of the exterior weatherproofing material.
- E. Primer: As recommended by adhesive manufacturer to clean surface of solid surfacing to ensure adhesion of adhesives and sealants.
  - 1. Use primers that comply with VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113.

**2.4 FABRICATION**

- A. Countertops:
  - 1. Molded countertop of solid polymer material.
  - 2. Provide edge details as indicated.
  - 3. Provide with apron, coved backsplash, and endsplash.
- B. Assemble work at shop and deliver to project ready for installation. Fabricated in largest practical lengths with seams in least conspicuous locations.
- C. Fabricate work square and to required lines.
- D. Recess and conceal fasteners, connections, and reinforcing.

- E. Design construction and installation details to allow for expansion and contraction of materials. Properly frame material with tight, hairline joints held rigidly in place.
- F. Comply with adhesive manufacturer's recommendations for adhesive shelf life, pot life, working life, mixing, spreading, assembly time, time under pressure and ambient temperature.
- G. Fabricate items to profiles shown with connections and supports as detailed or as required for proper installation per manufacturer's recommendations.
- H. Provide cut-outs for plumbing fixtures and trim, washroom accessories, appliances, and related items. Confirm lay-out with manufacturer's cut-outs templates before beginning work. Round corners of cut-outs and sand edges smooth.
- I. Do not exceed manufacturer's recommended unsupported overhang distances.
- J. Fabricate solid polymer to following thicknesses, unless indicated otherwise:
  - 1. Countertop: 1/2 inch
  - 2. Splash: 1/2 inch

### **PART 3 - EXECUTION**

#### **3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.

#### **3.2 INSTALLATION**

- A. Install in accordance with Section 017300, manufacturer's instructions, and approved shop drawings.
- B. Install units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.
- C. Apply dabs of mastic on supports; place items on supports and securely attach.
- D. Install splashes using mastic. Apply mastic to back surface only. Place thin bead of seam adhesive along edge where splashes seat.

#### **3.3 CLEANING**

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage surface or surrounding construction.
- B. Promptly remove excessive mastic and seam adhesive.

#### **3.4 PROTECTION**

- A. Protect finished work in accordance with Section 017300.

### **END OF SECTION**





**SECTION 123664****ENGINEERED STONE COUNTERTOPS****PART 1 - GENERAL****1.1 SUMMARY**

- A. Section Includes: Quartz countertops
- B. Related Sections:
  - 1. Section 064116 – Plastic Laminate Clad Architectural Cabinets.
  - 2. Division 22 – Plumbing.
- C. This Project is a registered US Green Building Council “LEED” project.
  - 1. Select locally or regionally fabricated products wherever possible.
  - 2. Provide materials certified by GreenGuard as “low-emitting” materials.

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Include physical properties and performance criteria for sheet materials and related components.
  - 1. Submit color charts for finish indicating manufacturer's colors available for selection.
- C. Shop Drawings: Indicate materials, dimensions, fabrication details, jointing methods, anchorages, and attachment provisions.
- D. Samples: Submit 6 by 6 inch in size illustrating color, pattern, and edge treatment each solid surface material.
- E. Closeout Submittals: Submit maintenance data in accordance with Section 017700.
- F. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials:
    - a. Countertops.
  - 2. LEED Credit EQc4.1: Provide “GreenGuard” countertop VOC Emissions Data for the following materials. This information should be available on Material Safety Data Sheets (MSDS) or other product manufacturer’s literature. Provide the product manufacturer’s most current VOC emissions data:
    - a. Countertops.

**1.3 QUALITY ASSURANCE**

- A. Regulatory Requirements: Comply with Authorities Having Jurisdiction to accommodate barrier free design.
- B. Single Source Responsibility: Furnish each unit from one manufacturer, unless otherwise acceptable to Architect.
- C. Fabricator Qualifications: Company specializing in fabricating work specified in this Section with minimum five years experience.

**1.4 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with Section 016000. Provide protective coverings of suitable material. Take special precautions at corners.

**1.5 WARRANTY**

- A. Comply with provisions of Section 017700.
- B. Furnish warranty against defects in material for 10 years. Include material and labor to repair or replace defective materials.

**PART 2 - PRODUCTS****2.1 MANUFACTURERS AND PRODUCTS**

- A. Acceptable Product: Refer to Color and Material Schedule on Drawings.

**2.2 MATERIALS**

- A. Quartz Countertop Composition: 93 percent crushed quartz aggregate combined with resins and pigments and fabricated into slabs using a vacuum vibro-compaction process.
- B. Material certified by NSF International for food and water contact.
- C. GreenGuard certified as low-emitting material.
- D. Identification: Label material with batch number and imprint on back with manufacturer's identifying mark.
- E. Physical Properties:
  - 1. Flexural Strength: 7,400 psi min, ASTM C880.
  - 2. Absorption: Less than 0.02 percent, ASTM C97
  - 3. Mohs Hardness: 6.5-7.5; scratch test.
  - 4. Stain and Acid Resistance: Not affected; ASTM D2299.
  - 5. Wear Resistance: 36.12 gram average; ASTM C501, tested with 1 kg. load, 1000 cycles at 70 rpm.
  - 6. Surface Burning: Flame Spread 10; Smoke Density 195; ASTM E84.
  - 7. Thermal Shock Resistance: Passes 5 cycles, 75 – 295 degrees F; ASTM C484.

**2.3 ACCESSORIES**

- A. Mastic: Type recommended by manufacturer.
- B. Seam Adhesive: Type recommended by manufacturer; color to blend with sheet material.
- C. Sealants: Type recommended by manufacturer.
- D. Adhesives & Sealants: Only use adhesives and sealants in the interior of the building that comply with VOC limits of the CURRENT requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1168.
  - 1. Current requirement refers to the date on which the materials are installed in the building.
  - 2. SCAQMD Rule #1168 referenced in Section 018113 that was current as of the date of this specification. Refer to <http://www.aqmd.gov/rules> for the actual current version of the rule that will be applicable at the date of installation during construction.
  - 3. Interior refers to all building construction that is inside of the exterior weatherproofing material.
- E. Primer: As recommended by adhesive manufacturer to clean surface of quartz surfacing to ensure adhesion of adhesives and sealants.
  - 1. Use primers that comply with VOC limits of the current requirements of South Coast Air Quality Management District (SCAQMD) Rule No. 1113.

**2.4 COUNTERTOP FABRICATION**

- A. General: Assemble work at shop and deliver to project ready for installation. Fabricated in largest practical lengths with seams in least conspicuous locations.
  - 1. Countertops:
    - a. Molded countertop of solid polymer material.
    - b. Provide edge details as indicated.
    - c. Provide with apron, coved backsplash, and endsplash where indicated on Drawings.
  - 2. Fabricate work square and to required lines.
  - 3. Recess and conceal fasteners, connections, and reinforcing.
  - 4. Design construction and installation details to allow for expansion and contraction of materials. Properly frame material with tight, hairline joints held rigidly in place.
  - 5. Comply with adhesive manufacturer's recommendations for adhesive shelf life, pot life, working life, mixing, spreading, assembly time, time under pressure and ambient temperature.

6. Fabricate items to profiles shown with connections and supports as detailed or as required for proper installation per manufacturer's recommendations.
  7. Provide cut-outs for plumbing fixtures and trim, washroom accessories, appliances, and related items. Confirm lay-out with manufacturer's cut-outs templates before beginning work. Round corners of cut-outs and sand edges smooth.
  8. Polish edges and returns that will be exposed to view or food contact.
  9. Do not exceed manufacturer's recommended unsupported overhang distances.
- B. Fabricate quartz countertop and splashes to following thicknesses; unless indicated otherwise:
1. Countertop: 3/4-inch.

**NOT USED****PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.

**3.2 INSTALLATION**

- A. Install in accordance with Section 017300, manufacturer's instructions, and approved Shop Drawings.
1. Install units plumb, level, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding construction.
  2. Allow gaps for expansion of not less than 1/16-inch per five feet when installed between walls or other fixed conditions.
  3. Apply dabs of mastic on supports; place items on supports and securely attach.
- B. Splashes: Install splashes at back and sides of countertops using mastic. Apply mastic to back surface only. Place thin bead of seam adhesive along edge where splashes seat.
1. Seal joint between countertop and splashes and between splashes and walls with color coordinated Sealant Designation S-S as specified in Section 079200.

**3.3 CLEANING AND PROTECTION**

- A. Clean as recommended by manufacturer. Do not use materials or methods which may damage surface or surrounding construction.
1. Promptly remove excessive mastic and seam adhesive.
- B. Protect finished work in accordance with Section 017300.

**END OF SECTION**



**SECTION 124813**  
**ENTRANCE FLOOR MATS AND FRAMES**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. This Project is a registered US Green Building Council "LEED" project.
  - 1. Select materials to maximize use of recycled aluminum.
  - 2. Select materials that contribute to indoor chemical and pollutant source control credit.

**1.2 SYSTEM REQUIREMENTS**

- A. Interface with Adjacent Systems: Set frame perimeter flush with surrounding flooring material within specified installation tolerances.

**1.3 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Product Data: Submit product data for floor mats.
- C. Shop Drawings:
  - 1. Submit shop drawings for floor mats.
  - 2. Indicate layout including dimensions each mat unit, showing locations of joints between sections.
  - 3. Submit full scale, dimensioned, detail drawings of frame and mat profiles, anchors, and internal connections.
  - 4. Submit detail drawings of special accessory components not included in manufacturer's product data.
- D. Samples:
  - 1. Submit tread insert samples indicating manufacturer's full range of available colors, textures, finishes, and patterns for selection by Architect.
  - 2. Submit samples of selected frame material finish.
  - 3. Submit samples of mat indicating manufacturer's full range of available colors, textures, finishes, and patterns for selection by Architect.
- E. Submit following Informational Submittals: Manufacturer's instructions.
- F. Closeout Submittals:
  - 1. Submit under provisions of Section 017700.
  - 2. Operation and Maintenance Data. Submit manufacturer's printed, recommended operation and maintenance data.
- G. LEED Data: Provide special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Provide special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
    - a. Aluminum and carpet inserts.
  - 2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post-consumer recycled content of metal materials based on material cost per weight for the following materials:
    - a. Aluminum.
  - 3. LEED Credit EQc5: Product Data showing walk-off mat size and effectiveness in removing pollutants from foot travel.

**1.4 QUALITY ASSURANCE**

- A. Single Source Responsibility:
  - 1. Furnish products from one manufacturer for entire Project, unless otherwise acceptable to Architect.
  - 2. Provide each floor mat as complete unit, including frame and accessory items necessary for proper installation and function.

**B. Regulatory Requirements:**

1. Ensure non-metal components comply with applicable portions of local, state, and federal codes, laws, and ordinances for flame spread and smoke developed indices.
2. Comply with Authorities Having Jurisdiction and Americans with Disabilities Act (ADA) including ADA Accessibility Guidelines to accommodate barrier free design.

**1.5 PROJECT CONDITIONS**

- A. Delay installation of floor mat frames until after building enclosure is complete and related interior finish work is complete.
- B. Recessed Frame: Install floor mat frames integrally with placement of concrete floor system.

**PART 2 - PRODUCTS****2.1 PRODUCTS AND MANUFACTURERS**

- A. Acceptable Manufacturers, Recessed Installation:
  1. Basis of Design: Ultra-Entry, Mats Inc.
  2. Arden Architectural Specialties, Inc.
  3. Construction Specialties, Inc.

**2.2 MATERIALS**

- A. Extruded Aluminum: ASTM B221; alloy and temper as recommended by manufacturer for strength, corrosion resistance, and application of specified finish.
- B. Vinyl Foot Grid: Constructed from 30 percent pre-consumer recycled polyvinyl chloride (PVC) in gray color. Welded in a non-hinged, grille design with an embossed non-skid surface, to sizes indicated with polyamide nylon 6.6 fiber carpet insert, color as selected by Architect.

**2.3 FABRICATION**

- A. Frames:
  1. Fabricate manufacturer's standard frame profiles to fit size and style of mat for permanent installation.
  2. Fabricate frame members in single lengths or, where dimensions exceed maximum available lengths, provide minimum number of pieces possible with hairline joints equally spaced, and with pieces spliced together by means of straight connecting pins.
  3. Cope or miter and rigidly connect frame corners and intersections with stainless steel fasteners or by welding.
- B. Carpet Inserts: Securely bond to rails.

**2.4 FINISHES**

- A. Aluminum Surfaces: Clear anodized.
- B. Insert Color: As selected from manufacturer's standard samples submitted.
- C. Aluminum Surfaces in Contact With Concrete or Grout: Shop coat with zinc chromate primer.

**PART 3 - EXECUTION****3.1 EXAMINATION**

- A. Examine conditions and proceed with work in accordance with Section 017300.
- B. Verify preparatory work by other trades is complete.

**3.2 PREPARATION**

- A. Assemble frame rails and securely fasten sections together.

**3.3 INSTALLATION**

- A. Install mat and frames in accordance with manufacturer's instructions and approved shop drawings.
- B. Install frames in level and accurate plane, square, and free from warp or twist while maintaining dimensional tolerances and alignment with surrounding surfaces.
- C. Recessed Frame:
  - 1. Provide necessary shims, spacers, and anchorages to position and hold frame securely in position during placement of grout.
  - 2. Coordinate with other trades as required.
- D. Installation Tolerances:
  - 1. Horizontal variation of frame from dimensioned location: Plus or minus 1/4 inch.
  - 2. Maximum perimeter gap between mat and frame: 3/16 inch.
  - 3. Maximum offset between adjacent members at joints: 1/32 inch.
  - 4. Vertical variation from plane of floor:
    - a. Hard surfaced floors: Plus 0 to minus 1/8 inch from finished floor surface.
    - b. Carpeted floors: Plus 1/4 to minus 0 inch from finished subfloor surface.
  - 5. Maximum variation in subfloor flatness: 1/8 inch in 10'-0".

**3.4 CLEANING**

- A. Clean mats as recommended by manufacturer. Do not use materials or methods which may damage metal finish, insert surfaces, or surrounding construction.
- B. Clean recesses to remove dust and debris before final installation of mat.

**3.5 PROTECTION**

- A. Protect finished work in accordance with Section 017300.
- B. Recessed Installation:
  - 1. After completion of frame installation, provide temporary filler of plywood or other suitable material in mat recesses.
  - 2. Cover exposed frames to protect from traffic damage during construction.
  - 3. After fitting, remove and store mat until near Substantial Completion of Project to protect from damage.

**END OF SECTION**





**SECTION 129313  
BICYCLE RACKS****PART 1 - GENERAL****1.1 SUMMARY**

- A. This Project is a US Green Building Council LEED project.
  - 1. Select materials to maximize use of recycled steel.
  - 2. Select locally or regionally fabricated products wherever possible.
  - 3. Comply with LEED requirements for alternative transportation;

**1.2 SUBMITTALS**

- A. General: Submit in accordance with Section 013300.
- B. Shop Drawings: Submit for specially fabricated items. Indicate details necessary for complete fabrication and installation, including spacing and sizes of connections and members, finishes of members, and other necessary information.
- C. Samples: Submit samples of finishes and colors of materials for selection by Architect.
- D. LEED Data: Furnish special submittals conforming to Section 018113 - Sustainable Design Requirements for the following:
  - 1. LEED Credit MR Cost Data: Submit special materials cost data breakdown data for the following materials. Provide separate data for each different manufacturer used:
    - a. Bicycle Racks.
  - 2. LEED Credit MRc4: Provide documentation certifying the percentage of pre-consumer and post –consumer recycled content of metal materials based on material cost per weight for the following materials:
    - a. Bicycle Racks.
  - 3. LEED Credit MRc5: Provide documentation identifying the location of extraction, harvest and manufacturer of the following materials:
    - a. Bicycle Racks.

**1.3 COORDINATION**

- A. Coordinate with other sections of Specifications to ensure proper scheduling for delivery and installation of Work and to ensure that proper provisions are made for installation of work specified.

**PART 2 - PRODUCTS****2.1 STEEL PIPE BICYCLE RACKS (Class III)**

- A. Class III Definition: Light security, allows bicycle frame and both wheels to be secured by six-foot cable carried by cyclist. It also allows U-shaped lock to secure bicycle frame and one wheel to rack.
- B. Type:
  - 1. Serpentine 2.375 inch outside diameter galvanized steel.
  - 2. ASTM A53 Grade A Schedule 40 pipe.
  - 3. Length: Each unit for 5 bicycles.
  - 4. Mounting: Flange mounted.
  - 5. Acceptable Products:
    - a. Ribbon Rack, AAA Ribbon Rack Co.
    - b. Original CycLoops 2170, Columbia Cascade.
    - c. Heavy-Duty Winder, Madrax.
- C. Non-Shrink Grout:
  - 1. Pre-mixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing additives.
  - 2. Minimum Compressive Strength at 28 Days: 5000 psi.

3. Acceptable Products:
  - a. Crystex, L and M Construction Chemicals, Inc., Omaha, NE.
  - b. Masterflow 713, Master Builders, Cleveland, OH.
  - c. Euco N.S., Euclid Chemical Company, Cleveland, OH.
  - d. SikaGrout 212, Sika Corporation, Lyndhurst, NJ.
  - e. SonogROUT 10K, Sonneborn Building Products, Shakopee, MN.

## **2.2 FABRICATION**

- A. Fabricate units from continuous pipe without splices.
- B. Bends:
  1. Bend rails in jigs.
  2. Do not damage or distort pipe and maintain cylindrical cross-section of pipe maintained throughout bend.
  3. Form bends free from buckles and twists, with finished surfaces smooth.
- C. Coat materials in contact with concrete with bituminous paint.

## **PART 3 - EXECUTION**

### **3.1 PREPARATION**

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation.
- B. Clean sleeves of debris.

### **3.2 INSTALLATION**

- A. Install in accordance with approved shop drawings.
- B. Install bicycle racks at locations indicated on Drawings.
- C. Install racks in straight line, plumb, and level.
- D. Anchoring Units:
  1. Securely anchor each unit in accordance with manufacturer's instructions.
  2. Class II Units:
    - a. Anchor posts in preset sleeves anchored in concrete or drilled holes. Drill holes 1 inch greater than outside diameter of pipe post.
    - b. Fill annular space between posts and sleeves solid with non-shrink non-metallic grout.
    - c. Wipe off excess grout and leave 1/8 inch build-up sloped away from post.
  3. Class III Units:
    - a. Anchor posts in preset sleeves anchored in concrete or drilled holes. Drill holes 1 inch greater than outside diameter of pipe post.
    - b. Fill annular space between posts and sleeves solid with non-shrink non-metallic grout.
    - c. Wipe off excess grout and leave 1/8 inch build-up sloped away from post.

### **3.3 PROTECTION**

- A. Protect bicycle racks from damage and defacement until final acceptance. Replace damaged or defaced bicycle racks with new units prior to final acceptance.

**END OF SECTION**

**SECTION 133441**  
**PREFABRICATED MODULAR BUILDINGS**

**PART 1 - GENERAL****1.1 SUMMARY**

- A. Provide and install new pre-manufactured modular trailers for use as temporary living quarters (bunk room and locker room).
- B. The general contractor shall coordinate all aspects of the temporary trailers for a complete and occupiable installation, including all site related requirements, all utility requirements and all permitting required from all Authorities Having Jurisdiction (AHJ).
- C. Coordinate installation of anchorages for buildings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- D. Provide and coordinate all power, hot and cold water, sewer and other utilities, as well as heating, cooling and, lighting as required for living.

**1.2 SUBMITTALS**

- A. Regulatory Requirements:
  - 1. Regulatory reviews shall include but not be limited to:
    - a. Montgomery County Department of Permitting Services (DPS)
    - b. Washington Suburban Sanitary Commission (WSSC)
    - c. Montgomery County Fire Marshal's Office
  - 2. Coordinate the permitting of all site and temporary trailer related items including but not limited to:
    - a. Grading
    - b. Foundation and structural design
    - c. Domestic water and Fire Protection
    - d. Power (including Fire Alarm)
    - e. Natural Gas (if required)
    - f. Sanitary Sewer
    - g. Storm Sewer
    - h. Communications
    - i. Coordination with Fire Alert System
    - j. Security
    - k. Plumbing Fixture Calculation
  - 3. Trailers to contain compliance certification and permit approval sticker from manufacturer/fabricator.
    - a. Provide copy of certification to owner and architect.
  - 4. All drawings shall be sealed by a registered professional licensed in Maryland.
- B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. Submit approved permit drawings to architect for review prior to commencing fabrication.
- C. Samples for Verification: For each type of exposed interior and exterior finish required.

**1.3 QUALITY ASSURANCE**

- A. General contractor is to hire a structural engineer to provide sealed engineered foundation plans.
- B. Regulatory Requirements: Comply with all state and local codes, including but not limited to the International Building Code (IBC), The Life Safety Code (NFPA 101) accessibility requirements, "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)."
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction, and marked for

- intended use.
- D. Pre-installation Conference: Conduct conference at Projects site.

#### **1.4 COORDINATION**

- A. Sequence of operations to be shown in required ICPM and other schedules.
- B. Coordinate installation of anchorages for buildings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Coordinate the delivery, installation, final utility connections, as well as removal and proper disposal of the temporary trailers and all associated components. Upon removal of temporary trailers, the general contractor shall return the site and building condition to like new conditions. Terminate and cap all abandoned utilities.
- D. Coordination with Owner's Fire Alerting System is required.

### **PART 2 - PRODUCTS**

#### **2.1 PREFABRICATED BUILDINGS**

- A. Chassis Type:
  - 1. Perimeter: Main rails, front and rear members are all made of the same structural steel, (I-beam-channel or roll formed C channel), around the edge of the unit. Generally, the subfloor plywood is applied directly to the joists.
- B. Roofing, flashing, scuppers and downspouts: Manufacturer's standard.
- C. Exterior Siding: Vertical corrugated .019" aluminum. Interlocking edges ensure a weather tight seal. Color as selected by Architect.
- D. Skirting: provide insulated skirting around entire perimeter of trailers.
- E. Floors:
  - 1. Conform to state and municipal jurisdiction for floor loading required for application.
  - 2. Insulation "R" Value: Meet minimum Code requirements.
- F. Subfloors: Minimum 3/4" thick tongue & grooved sturdy-floor plywood.
- G. Exterior Decks: Architect's selection from manufacturer's standard.
- H. Stair and Ramp Access: Wood steps and ramp with wood railing at exterior and access from Fabric roof structure.
- I. Exterior Doors: Hollow metal doors and frames, heavy-duty, insulated, commercial grade hardware.
- J. Fixed Windows: Extruded-aluminum sash frames glazed with clear insulating glass.
  - 1. Finish: Clear anodic.
- K. Electrical Power Service: As standard for use.
- L. Heating and Cooling Unit: Manufacturer's standard.
- M. Since a single water line is planned to serve both the domestic water and fire protection, a backflow preventer is to be provided with trailer.
- N. Protect all exterior exposed piping from freezing.
- O. Finishes: Refer to Drawings.

### **PART 3 - EXECUTION**

#### **3.1 INSTALLATION**

- A. Install on concrete base in accordance with manufacturer's instructions and AHJ.
- B. Set plumb and aligned. Level base plates true to plane with full bearing on concrete bases.
- C. Connect electrical power service to power distribution system.
- D. Connect the trailers to the future sanitary plumbing connection provided on the East side of the apparatus bay addition.
- E. Connect the trailers to the future water connection provided on the East side of the apparatus bay addition.
- F. Adjust doors, operable windows, and hardware to operate smoothly, easily, properly, and without binding. Confirm that locks engage accurately and securely without forcing or binding.

- G. Lubricate hardware and other moving parts.
- H. After completing installation, inspect exposed finishes and repair damaged finishes.
- I. Move existing bunk beds from existing location into trailer.
- J. When no longer required, remove trailers and restore site as described in Article 1.4.C.

**END OF SECTION**