



# NORTHERN ARIZONA UNIVERSITY

**STUDENT AND ACADEMIC SERVICES BUILDING**  
**NAU Project No: 09.600.141**

**PROJECT MANUAL**  
**DIVISIONS 00 - 14**

**RECORD DRAWINGS**  
**JANUARY 29, 2016**

**hardison/downey**  
construction, inc.



DWL Architects – Planners, Inc.  
2333 N. Central Avenue  
Phoenix, AZ 85004  
DWL No. 1400.00

SECTION 00 00 10  
PROJECT PRINCIPALS



**STUDENT AND ACADEMIC SERVICES BUILDING**  
**DWL Project No. 1400.00**

OWNER	Northern Arizona University Flagstaff, Arizona 86011
CONSTRUCTION MANAGER/CONTRACTOR	Hardison - Downey 6150 N. 16 <sup>th</sup> Street, Suite A. Phoenix, AZ 85016
ARCHITECTS	DWL Architects + Planners, Inc. 2333 N. Central Avenue Phoenix, Arizona 85004
MECHANICAL, PLUMBING & ELECTRICAL	LSW Engineers Arizona, Inc. 2333 W. Northern Avenue Phoenix, AZ 85021
STRUCTURAL ENGINEER	Caruso Turley Scott Structural Engineers 1215 W. Rio Salado Pkwy., Suite 200 Tempe, AZ 85281
CIVIL ENGINEER	The WLB Group 500 N. Beaver Street Flagstaff, AZ 86001
AUDIO – VISUAL	CCS PRESENTATION SYSTEMS / SOUTHWEST 17350 N. Hartford Dr. Scottsdale, AZ 85255

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26 51 00 INTERIOR LIGHTING FIXTURES & LAMPS

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INFORMATIONAL DOCUMENTS

PART 1 - GENERAL

1.1 INFORMATIONAL DOCUMENTS

- A. The following documents are not Contract Documents, but are available for examination or purchase. Failure to examine and review these documents shall in no way relieve the Contractor or the subcontractors from furnishing materials or equipment, or performing work, that may be required to complete the Work in accordance with the Contract Documents and the referenced documents at no additional cost. The Contractor or subcontractor will not be given extra payment for work related to requirements or conditions which can be determined by examination of these documents.

1. Report on Geotechnical Investigation, by Speedie and Associates  
NAU San Francisco Garage  
NWC San Francisco Street & Blome Drive  
NAU Parking Lot 'P-28'  
Flagstaff, Arizona  
Project No. 110250SF  
April 11, 2011

Addendum No. 1, September 26, 2011.  
Addendum No. 2, July 14, 2011.  
Addendum No. 3, October 18, 2011.  
Addendum No. 4, November 22, 2011.  
Addendum No. 5, March 24, 2014.

- B. These reports were obtained only for the Architect's use in design and are not part of the Contract Documents.

1. The report is not a warranty of subsurface conditions.
2. Examine existing conditions on site.
3. Contractor and subcontractors are responsible for their own determination of the subsurface conditions. They may satisfy themselves as to site and subsurface conditions with their own subsurface investigations.

END OF SECTION 00 00 25

SECTION 01 10 00

SUMMARY

PART 1 - GENERAL

1.1 SUMMARY

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

1.2 PROJECT INFORMATION

- A. Project Identification: Northern Arizona University Student and Academic Services Building
1. Project Location: 1101 S. San Francisco St.  
Flagstaff, AZ 86011  
(On the Campus of Northern Arizona University)
  2. Owner: Northern Arizona University.
- B. Architect: DWL Architects + Planners, Inc.
- C. Construction Manager / Contractor: Hardison-Downey.

1.3 WORK COVERED BY CONTRACT DOCUMENTS

- A. The Work of Project is defined by the Contract Documents and consists of the following:
1. Work includes but is not limited to construction of the new 93,378 sq. ft. Student Academic Services Building on the campus of Northern Arizona University.
- B. Type of Contract.
1. Project will be constructed under a single prime contract with Hardison-Downey.

1.4 ACCESS TO SITE

- A. General: Contractor shall have full use of Project site for construction operations during construction period. Contractor's use of Project site is limited only by Owner's right to perform work or to retain other contractors on portions of Project.

## 1.5 COORDINATION WITH OCCUPANTS

- A. Owner Limited Occupancy of Completed Areas of Construction: Owner reserves the right to occupy and to place and install equipment in completed portions of the Work, prior to Substantial Completion of the Work, provided such occupancy does not interfere with completion of the Work. Such placement of equipment and limited occupancy shall not constitute acceptance of the total Work.
1. Architect will prepare a Certificate of Substantial Completion for each specific portion of the Work to be occupied prior to Owner acceptance of the completed Work.
  2. Obtain a Certificate of Occupancy from authorities having jurisdiction before limited Owner occupancy.
  3. Before limited Owner occupancy, mechanical and electrical systems shall be fully operational, and required tests and inspections shall be successfully completed. On occupancy, Owner will operate and maintain mechanical and electrical systems serving occupied portions of Work.
  4. On occupancy, Owner will assume responsibility for maintenance and custodial service for occupied portions of Work.
- B. Contractor shall prearrange time with the Architect and Owner whenever it becomes necessary to interrupt any service to make connections, alterations or relocations and shall fully cooperate with NAU in doing Work so as to cause the least annoyance and interference with the continuous operation of NAU's business or official duties. Existing plumbing, heating, ventilating, air conditioning or electrical disconnections which may affect portions of existing buildings or other construction projects must be coordinated with the Architect and Owner. In no case, unless previously approved in writing by Owner, shall utilities be left disconnected at the end of a work day or over a weekend. Any interruption of utilities shall be reported immediately to the NAU Project Manager. Such interruptions, whether negligently, intentionally, or accidentally, shall not relieve the Contractor's responsibility for the interruption or from liability for loss or damage caused by such interruption even though such loss or damage was not foreseeable by Contractor or subcontractor, or from responsibility for repairing and restoring the utility to normal service. Repairs and restoration shall be made before the Contractor leaves the project site.

## 1.6 WORK RESTRICTIONS

- A. Work Restrictions, General: Comply with restrictions on construction operations.
1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.
  2. Truck washing stations, truck tire scraping grates and street sweeping may be required by NAU. Access to site shall be provided as to keep construction activity, dirt and mud on site.
  3. Communication with occupants of adjacent buildings is to be sent through the NAU Project Manager. Impact requests should be requested a minimum of 72 hours prior to the proposed starting time. Requests may not be approved and may be rescheduled to meet occupant needs.
  4. Use of the site is restricted to materials and equipment necessary to completion of the Work. It is the contractor's responsibility to ensure enclosure of the site from the general public.

## 1.7 SPECIFICATION AND DRAWING CONVENTIONS

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

- C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:
1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
  2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 10 00

## SECTION 01 11 16

### OWNER-FURNISHED ITEMS AND WORK

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. Section includes: Items and work furnished or installed by Northern Arizona University (NAU) as the Owner.
  - 1. Work by NAU.
  - 2. NAU-furnished products.
  - 3. NAU-furnished, Contractor installed products.
- B. This Section describes the responsibilities of the Contractor regarding Owner-furnished equipment and work
- C. It shall be the Contractor's responsibility to coordinate installation of the equipment or system with other trades. Any problems noted shall be brought to the attention of the Architect. This notification must be submitted in writing and no claims for additional work shall be considered unless the request for clarification has been initiated by the Contractor in a timely fashion.

##### 1.3 DEFINITIONS

- A. The following notations are used throughout the Contract Documents. An explanation of each of these notations is described as follows:
  - 1. OFCI - Owner-furnished/Contractor-installed.
  - 2. CFCI - Contractor-furnished/Contractor-installed.
  - 3. OFOI - Owner-furnished/Owner-installed
- B. OFCI - The Contractor shall be responsible for the receiving and providing of all rough-in services, installing and testing of the equipment or system provided by the Owner. The Contractor shall receive, inventory, verify quantity and condition and notify the Owner.
- C. OFCI - The Contractor shall be responsible for the receiving and provision of all rough-in services, installation and testing of the equipment or system provided by NAU. The Contractor shall receive, inventory, verify quantity and condition and notify NAU.
- D. CFCI - In general, the Contractor shall be responsible for the ordering, receiving, storing, protecting, installing and testing of the equipment or system. All items and systems are Contractor-furnished/Contractor-installed unless noted otherwise.
- E. OFOI - NAU will be responsible for furnishing and installing the equipment or system. The Contractor shall only be required to furnish the rough-ins as shown on the Contract Documents and to provide blocking or other necessary support. The Contractor shall be responsible that work provided under the

Contract Documents does not interfere with the installation of Owner-furnished/Owner-installed materials or equipment.

- F. N.I.C. - Certain items of equipment or elements of the construction may be excluded from the Contract, and if so, are indicated on the Drawings as "N.I.C." (not in contract). Installation of these items may be performed while the Contractor's Work is in progress. NAU has the right to begin installation of these elements prior to the acceptance or Substantial Completion of the Work as a whole. The Contractor shall cooperate with NAU to facilitate the expeditious installation of such items.

#### 1.4 SUBMITTALS

- A. Obtain from the equipment supplier shop and manufacturer's assembly and installation drawings for Owner-furnished equipment. Items noted on the Drawings but not listed in this section or items listed in this Section but not noted on the Drawings shall be included under this heading.
- B. Provide the Owner written notice of starting dates when Owner-furnished/Contractor-installed items must be received at the job site to insure project completion in accordance with the established schedule. This request for Owner-furnished items shall be on stationary bearing the Contractor's letterhead and signature. This list shall be submitted to the Owner's Representative and Architect within 15 days of awarding of the Contract, to permit proper action on same such that no delay occurs due to required lead time in ordering or delivery to the job site.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Certain equipment, fixtures, and items are indicated on the Drawings to be furnished by the Owner for assembly by the Contractor. The Owner will be responsible for delivery of the Owner-furnished items to the construction site. The Contractor shall assume responsibility for such acceptance of the new facility by the Owner. Assembly and installation shall include unloading, uncrating, setting in place, leveling, connection to utilities, the furnishing of required operating oils, and fluids, and such other procedures as may be required to render the equipment and fixtures serviceable and operative. Assembly and installation shall be performed in accordance with shop and manufacturer's assembly and installation drawings.
- B. Furnish the documents required by NAU substantiating the receipt of Owner-furnished equipment within 10 days of delivery.
- C. Refer to the specific sections of these specifications for a description of those items indicated as furnished by the Owner.

#### 1.6 SITE CONDITIONS

- A. Other Construction activities, under the direct supervision of the Owner, are anticipated in the same area of work during the construction period established for this Agreement. Both the Owner's activities and the Contractor's work may be in progress at the same time and shall have equal rights to use the roads, grounds, areas, etc. Coordinate activities that come into conflict. No request for additional compensation for any reason, in this connection, will be considered.
- B. Concurrent Work: Owner may award separate contract(s) for the construction operations at Project site. Those operations may be conducted simultaneously with work under this Contract.

PART 2 - PRODUCTS (Not Used)

2.1 EQUIPMENT AND MATERIALS

- A. Refer to drawings and specific Sections of these specifications for a description of those items and materials indicated as furnished by the Owner.

PART 3 - EXECUTION

3.1 PROCEDURES

- A. Obtain from the equipment supplier all shop and manufacturer's assembly and installation drawings for Owner-furnished equipment. Items noted on the Drawings but not listed in this section shall be included under this heading.
- B. Provide NAU written notice of starting dates when Owner-furnished/Contractor-installed items must be received at the job site to insure project completion in accordance with the established schedule. This request for Owner-furnished items shall be on stationary bearing the General Contractor's letterhead and signature. This list shall be submitted to NAU's Representative and Architect within 15 days of awarding of the Contract, to permit proper action on same such that no delay occurs due to required lead time in ordering or delivery to the job site.
- C. Certain equipment, fixtures, etc., are indicated on the Drawings to be furnished by NAU for assembly by the Contractor. NAU will be responsible for delivery of NAU-furnished items to the construction site. The Contractor shall assume responsibility for such acceptance of the new facility by NAU. Assembly and installation shall include unloading, uncrating, setting in place, leveling, connection to utilities, the furnishing of required operating oils, and fluids, and such other procedures as may be required to render the equipment and fixtures serviceable and operative. Assembly and installation shall be performed in accordance with shop and manufacturer's assembly and installation drawings.
- D. Other Construction activities, under the direct supervision of NAU, are anticipated in the same area of work during the construction period established for this Agreement. Both NAU's activities and the Contractor's work may be in progress at the same time and shall have equal rights to use the roads, grounds, areas, etc. Coordinate activities which come into conflict. No request for additional compensation for any reason, in this connection, will be considered.

3.2 SCHEDULES

- A. Equipment and materials that will be furnished by NAU:
  - 1. Telephone and Computer network system will be OFOI.
  - 2. Telephone and Computer network cabling will be CFCI.
  - 3. Vending machines will be OFOI.
  - 4. Trash Receptacles will be OFOI.
  - 5. Defibrillator (AED) will be OFCI.
- B. Other Construction activities, under the direct supervision of NAU, are anticipated in the same area of work during the construction period established for this Agreement. Both NAU's activities and the Contractor's work may be in progress at the same time and shall have equal rights to use the roads, grounds, areas, etc. Coordinate activities which come into conflict.

END OF SECTION 01 11 16

## SECTION 01 25 00

### SUBSTITUTION PROCEDURES

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for substitutions.
- B. Related Requirements:
  - 1. Section 01 60 00 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

##### 1.3 DEFINITIONS

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

##### 1.4 ACTION SUBMITTALS

- A. Substitution Requests: Submit one copy of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
  - 1. Substitution Request Form: Use CSI Form 13.1A (attached at the end of this Section) or other form acceptable to the Owner and the Architect.
  - 2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
    - a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
    - b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
    - c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
    - d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.

### SUBSTITUTION PROCEDURES

- e. Samples, where applicable or requested.
  - f. Certificates and qualification data, where applicable or requested.
  - g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
  - h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
  - i. Research reports evidencing compliance with building code in effect for Project, from ICC-ES.
  - j. Comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.
  - k. Cost information, including a proposal of change, if any, in the Contract Sum.
  - l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.
  - m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.
3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
- a. Forms of Acceptance: Change Order, Construction Change Directive, or Architect's Supplemental Instructions for minor changes in the Work.
  - b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

## 1.5 QUALITY ASSURANCE

- A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers (at the Contractor's expense).
- 1. Cost for testing shall be included in the substitution add or credit.
  - 2. For a substitution for convenience, if the substitution is not acceptable, the Contractor will not be reimbursed for testing.
  - 3. For a substitution for cause, if the substitution is not acceptable, the Contractor will be reimbursed for testing.
- B. Coordination: Revise or adjust affected work as necessary to integrate work of the approved substitutions.

## PART 2 - PRODUCTS

### 2.1 SUBSTITUTIONS

- A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than 15 days prior to time required for preparation and review of related submittals.
- 1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:

- a. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  - b. Requested substitution provides sustainable design characteristics that specified product provided for achieving LEED prerequisites and credits.
  - c. Substitution request is fully documented and properly submitted.
  - d. Requested substitution will not adversely affect Contractor's construction schedule.
  - e. Requested substitution has received necessary approvals of authorities having jurisdiction.
  - f. Requested substitution is compatible with other portions of the Work.
  - g. Requested substitution has been coordinated with other portions of the Work.
  - h. Requested substitution provides specified warranty.
  - i. Requested substitution has been coordinated with other portions of the Work, other subcontractors, Owner's contractors and is uniform and consistent, is compatible with other products, and is acceptable to all entities involved.
- B. Substitutions for Convenience: Architect will consider requests for substitution if received within 90 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
    - a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
    - b. Requested substitution does not require extensive revisions to the Contract Documents.
    - c. Requested substitution is consistent with the Contract Documents and will produce indicated results.
    - d. Requested substitution provides sustainable design characteristics that specified product provided for achieving LEED prerequisites and credits.
    - e. Substitution request is fully documented and properly submitted.
    - f. Requested substitution will not adversely affect Contractor's construction schedule.
    - g. Requested substitution has received necessary approvals of authorities having jurisdiction.
    - h. Requested substitution is compatible with other portions of the Work.
    - i. Requested substitution has been coordinated with other portions of the Work.
    - j. Requested substitution provides specified warranty.
    - k. Requested substitution has been coordinated with other portions of the Work, other subcontractors, Owner's contractors and is uniform and consistent, is compatible with other products, and is acceptable to all entities involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 25 00

# SUBSTITUTION REQUEST

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Project: \_\_\_\_\_ Substitution Request Number: \_\_\_\_\_  
\_\_\_\_\_  
From: \_\_\_\_\_  
To: \_\_\_\_\_ Date: \_\_\_\_\_  
\_\_\_\_\_  
A/E Project Number: \_\_\_\_\_  
Re: \_\_\_\_\_ Contract For: \_\_\_\_\_

---

Specification Title: \_\_\_\_\_ Description: \_\_\_\_\_  
Section: \_\_\_\_\_ Page: \_\_\_\_\_ Article/Paragraph: \_\_\_\_\_

---

Proposed Substitution: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_ Address: \_\_\_\_\_ Phone: \_\_\_\_\_  
Trade Name: \_\_\_\_\_ Model No.: \_\_\_\_\_  
Installer: \_\_\_\_\_ Address: \_\_\_\_\_ Phone: \_\_\_\_\_

History:  New product  1-4 years old  5-10 years old  More than 10 years old

Differences between proposed substitution and specified product: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Point-by-point comparative data attached — REQUIRED BY A/E

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Reason for not providing specified item: \_\_\_\_\_  
\_\_\_\_\_

## Similar Installation:

Project: \_\_\_\_\_ Architect: \_\_\_\_\_  
Address: \_\_\_\_\_ Owner: \_\_\_\_\_  
\_\_\_\_\_ Date Installed: \_\_\_\_\_

Proposed substitution affects other parts of Work:  No  Yes; explain \_\_\_\_\_  
\_\_\_\_\_

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Savings to Owner for accepting substitution: \_\_\_\_\_ (\$ \_\_\_\_\_).

Proposed substitution changes Contract Time:  No  Yes [Add] [Deduct] \_\_\_\_\_ days.

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Supporting Data Attached:  Drawings  Product Data  Samples  Tests  Reports  \_\_\_\_\_

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# SUBSTITUTION REQUEST

The Undersigned certifies:

- Proposed substitution has been fully investigated and determined to be equal or superior in all respects to specified product.
- Same warranty will be furnished for proposed substitution as for specified product.
- Same maintenance service and source of replacement parts, as applicable, is available.
- Proposed substitution will have no adverse effect on other trades and will not affect or delay progress schedule.
- Cost data as stated above is complete. Claims for additional costs related to accepted substitution which may subsequently become apparent are to be waived.
- Proposed substitution does not affect dimensions and functional clearances.
- Payment will be made for changes to building design, including A/E design, detailing, and construction costs caused by the substitution.
- Coordination, installation, and changes in the Work as necessary for accepted substitution will be complete in all respects.

Submitted by: \_\_\_\_\_

Signed by: \_\_\_\_\_

Firm: \_\_\_\_\_

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

Telephone: \_\_\_\_\_

Attachments:

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## A/E's REVIEW AND ACTION

- Substitution approved - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
- Substitution approved as noted - Make submittals in accordance with Specification Section 01 25 00 Substitution Procedures.
- Substitution rejected - Use specified materials.
- Substitution Request received too late - Use specified materials.

Signed by: \_\_\_\_\_ Date: \_\_\_\_\_

Additional Comments:     Contractor     Subcontractor     Supplier     Manufacturer     A/E

SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements for handling and processing Contract modifications.
- B. Related Sections include the following:
  - 1. Division 01 Section "Product Requirements" for administrative procedures for handling requests for substitutions made after Contract award.

1.3 REQUESTS FOR INTERPRETATION

- A. Requests for Interpretation (RFI) shall be sent electronically the NAU Project Manager and the Architect concurrently. The RFI must indicate the NAU project number, RFI number, specification section and drawing sheet impacted, trades involved, images if applicable, a proposed solution and potential cost or time impact.

1.4 MINOR CHANGES IN THE WORK

- A. Architect will issue supplemental instructions authorizing Minor Changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.5 PROPOSAL REQUESTS

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

- d. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
- B. Contractor-Initiated Proposals: If latent or unforeseen conditions require modifications to the Contract, Contractor may propose changes by submitting a request for a change to Architect.
1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
  2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
  3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
  4. Include costs of labor and supervision directly attributable to the change.
  5. Include an updated Contractor's Construction Schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
  6. Comply with requirements in Division 01 Section "Product Requirements" if the proposed change requires substitution of one product or system for product or system specified.
- C. Proposal Request Form: Use AIA Document G709 for Proposal Requests.

#### 1.6 CHANGE ORDER PROCEDURES

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

#### 1.7 CONSTRUCTION CHANGE DIRECTIVE

- A. A construction change directive (CCD) may only be used at Owner's discretion when the identified field change must be completed before a formal change order can be issued to the Contractor. The Contractor shall provide the Owner a description of the required change and a not to exceed value.
- B. Construction Change Directive: Architect may issue a Construction Change Directive on AIA Document G714. Construction Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.
1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.
- C. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.
1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract for the development of a Change Order.
  2. The appropriate adjustments to the contract will be made through a Change Order. Actual costs must be fully substantiated before a Change Order will be issued.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 26 00

CONTRACT MODIFICATION PROCEDURES

01 26 00 - 2

SECTION 01 29 00

PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section specifies administrative and procedural requirements necessary to prepare and process Applications for Payment.

1.3 DEFINITIONS

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

1.4 SCHEDULE OF VALUES

- A. Coordination: Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

- 1. 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.
- c. Contractor's Construction Schedule.

- 2. Submit the Schedule of Values to Architect at earliest possible date but no later than seven days before the date scheduled for submittal of initial Applications for Payment.

- B. Format and Content: Use 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.
- c. Architect's project number.
- d. Contractor's name and address.
- e. Date of submittal.

- 2. Arrange the Schedule of Values in tabular form with separate columns to indicate the following for each item listed:

- a. Related Specification Section or 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.
- 1) Percentage of the Contract Sum to nearest one-tenth 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. Include separate line items under required principal subcontracts for operation and maintenance manuals, punch list activities, Project Record Documents, and demonstration and training in the amount of 5 percent of the Contract Sum.
  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.
    - a. Differentiate between items stored on-site and items stored off-site. If specified, include evidence of insurance or bonded warehousing.
    - b. Include separate line items under Contractor and principal subcontracts for LEED documentation and other Project closeout requirements in an amount totaling five percent of the Contract Sum and subcontract amount.
  6. Provide separate line items in the Schedule of Values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
  7. 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. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the Schedule of Values or distributed as general overhead expense, at Contractor's option.
  8. Schedule Updating: Update and resubmit the Schedule of Values before the next Applications for Payment when Change Orders or Construction Change Directives result in a change in the Contract Sum.

#### 1.5 APPLICATIONS FOR PAYMENT

- A. Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.
  1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.
- B. Payment Application Times: The date for each progress payment is indicated in the Agreement between Owner and Contractor. The period of construction Work covered by each Application for Payment is the period indicated in the Agreement.
- C. Payment Application Forms: Use AIA Document G702 and AIA Document G703 Continuation Sheets or other form acceptable to the Owner as form for Applications for Payment.
- D. Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.
  1. Entries shall match data on the Schedule of Values and Contractor's Construction Schedule. Use updated schedules if revisions were made.

#### PAYMENT PROCEDURES

2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
- E. Transmittal: Submit 3 signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within 24 hours. One copy shall include waivers of lien and similar attachments if required.
- F. Waivers of Mechanic's Lien: With each Application for Payment, submit waivers of mechanic's lien from every entity who is lawfully entitled to file a mechanic's lien arising out of the Contract and related to the Work covered by the payment.
1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
  2. When an application shows completion of an item, submit final or full waivers.
  3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
  4. Waiver Forms: Submit waivers of lien on forms, executed in a manner acceptable to Owner.
- G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
1. List of subcontractors.
  2. Schedule of Values.
  3. LEED submittal for project materials cost data.
  4. LEED action plans.
  5. Contractor's Construction Schedule (preliminary if not final).
  6. Submittals Schedule (preliminary if not final).
  7. List of Contractor's staff assignments.
  8. Copies of building permits.
  9. Copies of authorizations and licenses from authorities having jurisdiction for performance of the Work.
  10. Certificates of insurance and insurance policies.
  11. Performance and payment bonds.
  12. Data needed to acquire Owner's insurance.
- H. Application for Payment at Substantial Completion: After issuing the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
  2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.
- I. 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 Project closeout requirements.
  2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.
  3. Updated final statement, accounting for final changes to the Contract Sum.
  4. AIA Document G706, "Contractor's Affidavit of Payment of Debts and Claims."
  5. AIA Document G706A, "Contractor's Affidavit of Release of Liens."
  6. AIA Document G707, "Consent of Surety to Final Payment."
  7. Evidence that claims have been settled.
  8. Final meter readings for utilities and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

END OF SECTION 01 29 00

PAYMENT PROCEDURES

01 29 00 - 3

## SECTION 01 31 00

### PROJECT MANAGEMENT AND COORDINATION

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
  - 1. General coordination procedures.
  - 2. Coordination drawings.
  - 3. Requests for Interpretation (RFIs).
- B. Related Requirements:
  - 1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
  - 2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
  - 3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

##### 1.3 DEFINITIONS

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

##### 1.4 INFORMATIONAL SUBMITTALS

- A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design. Include the following information in tabular form:
  - 1. Name, address, and telephone number of entity performing subcontract or supplying products.
  - 2. Number and title of related Specification Section(s) covered by subcontract.
- B. Key Personnel Names: Prior to the Notice to Proceed, submit a list of key personnel assignments, including superintendent and other full time personnel employed by the Contractor in attendance at Project site. Identify individuals and their duties and responsibilities; list telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

## 1.5 GENERAL COORDINATION PROCEDURES

- A. Coordination: Coordinate construction operations indicated on the drawings and included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections that depend on each other for proper installation, connection, and operation.
  - 1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
  - 2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
  - 3. Make adequate provisions to accommodate items scheduled for later installation.
- B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
- C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
  - 1. Preparation of Contractor's construction schedule.
  - 2. Preparation of the schedule of values.
  - 3. Installation and removal of temporary facilities and controls.
  - 4. Delivery and processing of submittals.
  - 5. Progress meetings.
  - 6. Preinstallation conferences.
  - 7. Project closeout activities.
  - 8. Startup and adjustment of systems.
- D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.
  - 1. Salvage materials and equipment involved in performance of, but not actually incorporated into, the Work. See other Sections for disposition of salvaged materials that are designated as Owner's property.

## 1.6 COORDINATION DRAWINGS

- A. Coordination Drawings, General: Prepare coordination drawings to facilitate integration of products and materials fabricated or installed by more than one entity. **In lieu of coordination drawings the Contractor may create a computer model (BIM) and perform a "Clash Detection" simulation and report.**
  - 1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
    - a. Use applicable Drawings as a basis for preparation of coordination drawings. Prepare sections, elevations, and details as needed to describe relationship of various systems and components.
    - b. Coordinate the addition of trade-specific information to the coordination drawings by multiple contractors in a sequence that best provides for coordination of the information and resolution of conflicts between installed components before submitting to the Architect for review.
    - c. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.

- d. Indicate space requirements for routine maintenance and for anticipated replacement of components during the life of the installation.
- e. Show location and size of access doors required for access to concealed dampers, valves, and other controls.
- f. Indicate required installation sequences.
- g. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches at the same time as the submittal of the coordination drawings to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

B. Coordination Drawing Organization: Organize coordination drawings as follows:

- 1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid. Supplement plan drawings with section drawings where required to adequately represent the Work.
- 2. Above Ceiling Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling space to accommodate layout of light fixtures indicated on Drawings. Indicate areas of conflict between light fixtures, cameras, speakers, sprinkler heads, fire alarms and other components.
- 3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.
- 4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.
- 5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.
- 6. Mechanical and Plumbing Work: Show the following:
  - a. Sizes and bottom elevations of ductwork, piping, and conduit runs, including insulation, bracing, flanges, and support systems.
  - b. Dimensions of major components, such as dampers, valves, diffusers, access doors, cleanouts and electrical distribution equipment.
  - c. Fire-rated enclosures around ductwork.
  - d. Underground piping.
- 7. Electrical Work: Show the following:
  - a. Underground electrical conduit and equipment.
  - b. Runs of vertical and horizontal conduit 1-1/4 inches (32 mm) in diameter and larger.
  - c. Light fixture, exit light, emergency battery pack, smoke detector, and other fire-alarm locations.
  - d. Panel board, switch board, switchgear, transformer, bus way, generator, and motor control center locations.
  - e. Location of pull boxes and junction boxes dimensioned from column center lines.
  - f. Access control elements.
- 8. Fire-Protection System: Include information from approved shop drawings.
- 9. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility. If Architect determines that coordination drawings are not being prepared in sufficient scope or detail, or are otherwise deficient, Architect will so inform Contractor within 15 days of receipt of drawings from Contractor, who shall make changes as directed and resubmit within 15 days of receipt of comments from Architect.
- 10. Coordination Drawing Prints: Prepare coordination drawing prints according to requirements in Division 01 Section "Submittal Procedures."

C. Coordination Digital Data Files (BIM): Prepare coordination digital data files according to the following requirements:

1. File Preparation Format: Same digital data software program, version, and operating system as original Drawings (Revit 2011).
  2. BIM File Incorporation: Develop and incorporate coordination drawing files into Building Information Model established for Project.
    - a. Perform three-dimensional component conflict analysis as part of preparation of coordination drawings. Resolve component conflicts prior to submittal. Indicate where conflict resolution requires modification of design requirements by Architect.
  3. Architect will furnish Contractor one set of digital data files of Drawings for use in preparing coordination digital data files.
    - a. Architect makes no representations as to the accuracy or completeness of digital data files as they relate to Drawings.
- D. Coordination Drawings are for the Contractor's use. Architect and Owner will review coordination drawings for information only and to confirm completion of this requirement.
1. Option: Architect and Owner may consider a Building Information Model (BIM) Clash Detection Report in lieu of coordination drawings. Contractor shall obtain approval of this option prior to beginning the option.

#### 1.7 REQUESTS FOR INFORMATION (RFIs)

- A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.
1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.
  2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work.
- B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:
1. Project name.
  2. Project number.
  3. Date.
  4. Name of Contractor.
  5. Name of Architect.
  6. RFI number, numbered sequentially.
  7. RFI subject.
  8. Specification Section number and title and related paragraphs, as appropriate.
  9. Drawing number and detail references, as appropriate.
  10. Field dimensions and conditions, as appropriate.
  11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
  12. Contractor's signature.
  13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.
    - a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.
- C. RFI Forms: Software-generated form with substantially the same content as indicated, acceptable to the Owner and the Architect.
1. RFI Correspondence: Use project website software

2. Attachments shall be electronic files in Adobe Acrobat PDF format.
- D. Architect's and Contractor's Action: Architect and Contractor will review each RFI, determine action required, and respond. Allow 7 days for Architect's response for each RFI. RFIs received by Architect or Contractor after 1:00 p.m. will be considered as received the following working day.
1. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.
  2. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Division 01 Section "Contract Modification Procedures."
    - a. If Subcontractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect and Contractor in writing within 3 days of receipt of the RFI response.
  3. It is understood that the Owner provides for normal Architectural and Engineering liaison for the purpose of interpretation of the Drawings and Specifications. Should an RFI require more than two responses through no fault of the Architect, the Architect will charge the Owner and such costs will be deducted from money still due the Contractor.
- E. RFI Log: Contractor shall prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log weekly. Use software log with not less than the following:
1. Project name.
  2. Name and address of subcontractor.
  3. Name and address of Architect and Contractor.
  4. RFI number including RFIs that were returned without action or withdrawn.
  5. RFI description.
  6. Date the RFI was submitted.
  7. Date Architect's response was received.
- F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven days if Contractor or subcontractor disagrees with response.
1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.
  2. Identification of related Field Order, Work Change Directive, and Proposal Request, as appropriate.

## 1.8 PROJECT MEETINGS

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

2. Attendees: Authorized representatives of Owner, Commissioning Authority, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect progress, including the following:
    - a. Tentative construction schedule.
    - b. Phasing.
    - c. Critical work sequencing and long-lead items.
    - d. Designation of key personnel and their duties.
    - e. Lines of communications.
    - f. Procedures for processing field decisions and Change Orders.
    - g. Procedures for RFIs.
    - h. Procedures for testing and inspecting.
    - i. Procedures for processing Applications for Payment.
    - j. Distribution of the Contract Documents.
    - k. Submittal procedures.
    - l. LEED requirements.
    - m. Preparation of record documents.
    - n. Use of the premises.
    - o. Work restrictions.
    - p. Working hours.
    - q. Owner's occupancy requirements.
    - r. Responsibility for temporary facilities and controls.
    - s. Procedures for moisture and mold control.
    - t. Procedures for disruptions and shutdowns.
    - u. Construction waste management and recycling.
    - v. Parking availability.
    - w. Office, work, and storage areas.
    - x. Equipment deliveries and priorities.
    - y. First aid.
    - z. Security.
    - aa. Progress cleaning.
  4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- C. LEED Coordination Conference: Commissioning Authority will schedule and conduct a LEED coordination conference before starting construction, at a time convenient to Owner Architect, and Contractor.
1. Attendees: Authorized representatives of Owner, Commissioning Authority, Architect, and their consultants; Contractor and its superintendent and LEED coordinator; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
  2. Agenda: Discuss items of significance that could affect meeting requirements for LEED certification, including the following:
    - a. LEED Project Checklist.
    - b. General requirements for LEED-related procurement and documentation.
    - c. Project closeout requirements and LEED certification procedures.
    - d. Role of LEED coordinator.
    - e. Construction waste management.
    - f. Construction operations and LEED requirements and restrictions.
  3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.
- D. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, and Commissioning Authority of scheduled meeting dates.
  2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
    - a. Contract Documents.
    - b. Options.
    - c. Related RFIs.
    - d. Related Change Orders.
    - e. Purchases.
    - f. Deliveries.
    - g. Submittals.
    - h. LEED requirements.
    - i. Review of mockups.
    - j. Possible conflicts.
    - k. Compatibility requirements.
    - l. Time schedules.
    - m. Weather limitations.
    - n. Manufacturer's written instructions.
    - o. Warranty requirements.
    - p. Compatibility of materials.
    - q. Acceptability of substrates.
    - r. Temporary facilities and controls.
    - s. Space and access limitations.
    - t. Regulations of authorities having jurisdiction.
    - u. Testing and inspecting requirements.
    - v. Installation procedures.
    - w. Coordination with other work.
    - x. Required performance results.
    - y. Protection of adjacent work.
    - z. Protection of construction and personnel.
  3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
  4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
  5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.
- E. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 30 days prior to the scheduled date of Substantial Completion.
1. Conduct the conference to review requirements and responsibilities related to Project closeout.
  2. Attendees: Authorized representatives of Owner, Commissioning Authority, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:
    - a. Preparation of record documents.
    - b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    - c. Submittal of written warranties.
    - d. Requirements for completing LEED documentation.
    - e. Requirements for preparing operations and maintenance data.

- f. Requirements for delivery of material samples, attic stock, and spare parts.
  - g. Requirements for demonstration and training.
  - h. Preparation of Contractor's punch list.
  - i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
  - j. Submittal procedures.
  - k. Coordination of separate contracts.
  - l. Owner's partial occupancy requirements.
  - m. Installation of Owner's furniture, fixtures, and equipment.
  - n. Responsibility for removing temporary facilities and controls.
4. Minutes: Entity conducting meeting will record and distribute meeting minutes.
- F. Progress Meetings: Conduct progress meetings at weekly intervals.
- 1. Coordinate dates of meetings with preparation of payment requests.
  - 2. Attendees: In addition to representatives of Owner, Commissioning Authority and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
  - 3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.
    - a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.
      - 1) Review schedule for next period.
    - b. Review present and future needs of each entity present, including the following:
      - 1) Interface requirements.
      - 2) Sequence of operations.
      - 3) Resolution of BIM component conflicts.
      - 4) Status of submittals.
      - 5) Status of LEED documentation.
      - 6) Deliveries.
      - 7) Off-site fabrication.
      - 8) Access.
      - 9) Site utilization.
      - 10) Temporary facilities and controls.
      - 11) Progress cleaning.
      - 12) Quality and work standards.
      - 13) Status of correction of deficient items.
      - 14) Field observations.
      - 15) Status of RFIs.
      - 16) Status of proposal requests.
      - 17) Pending changes.
      - 18) Status of Change Orders.
      - 19) Pending claims and disputes.
      - 20) Documentation of information for payment requests.
4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

- a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 31 00

SECTION 01 32 00

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 01 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 Construction Schedule.
- 2. Submittals Schedule.
- 3. Daily construction reports.
- 4. Field condition reports.

- B. Related Sections include the following:

- 1. Division 01 Section "Payment Procedures" for submitting the Schedule of Values.
- 2. Division 01 Section "Project Management and Coordination" for submitting and distributing meeting and conference minutes.
- 3. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
- 4. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 SUBMITTALS

- A. Submittals Schedule: Submit three copies of schedule. 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.

- B. Contractor's Construction Schedule: Submit two opaque copies of initial schedule, large enough to show entire schedule for entire construction period.

- 1. Submit an electronic copy of schedule, using software indicated, on CD-R, and labeled to comply with requirements for submittals. Include type of schedule (Initial or Updated) and date on label.

- C. Daily Construction Reports: Submit two copies at monthly intervals.

- D. Field Condition Reports: Submit two copies at time of discovery of differing conditions.

#### 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, Submittals Schedule, 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.

#### 1.5 PHASING OF WORK

- A. Approval of Phasing: NAU reserves the right to review and approve scheduling or phasing of construction activities which have an impact on University functions or operations. Advise NAU when phases are indicated by the schedule. Act to lessen or avert impact to University operations through alternative phasing of activities or other measures.

#### 1.6 PROCUREMENT SCHEDULE

- A. Procurement Schedule: In addition to the Construction Schedule, NAU requires a Procurement Schedule for all major project components to be purchased and incorporated by the Contractor into the Project. The Procurement Schedule shall indicate scheduled delivery of major Project components, both equipment and materials, in support of the activities included on the Contractor's Construction Schedule.

### PART 2 - PRODUCTS

#### 2.1 SUBMITTALS SCHEDULE

- A. 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.
  - 1. Coordinate Submittals Schedule with list of subcontracts, the Schedule of Values, and Contractor's Construction Schedule.
  - 2. Final Submittal: Submit concurrently with the first complete submittal of Contractor's Construction Schedule.

#### 2.2 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

- A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
  - 1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.
  - 2. Time shall be calendar days. Indicate work on weekends, holidays, double shifts, and other non-standard workdays. If none, indicate as such.
- B. Activities: Treat each separate area as a separate numbered activity for each main element of the Work. Comply with the following:
  - 1. Activity Duration: Define activities so no activity is longer than 30 days, unless specifically allowed by Architect.

2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
  3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
  4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
  5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's and Contractor's administrative procedures necessary for certification of Substantial Completion.
  6. Punch List and Final Completion: Include not more than 60 days for completion of punch list items and final completion.
- C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
1. Phasing: Arrange list of activities on schedule by phase.
  2. Work under More Than One Contract: Include a separate activity for each contract.
  3. Work by Owner: Include a separate activity for each portion of the Work performed by Owner.
  4. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  5. Owner-Furnished Products: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.
  6. Work Restrictions: Show the effect of the following items on the schedule:
    - a. Coordination with existing construction.
    - b. Limitations of continued occupancies.
    - c. Uninterruptible services.
    - d. Partial occupancy before Substantial Completion.
    - e. Use of premises restrictions.
    - f. Provisions for future construction.
    - g. Seasonal variations.
    - h. Environmental control.
  7. Work Stages: Indicate important stages of construction for each major portion of the Work, including, but not limited to, the following:
    - a. Subcontract awards.
    - b. Submittals.
    - c. Purchases.
    - d. Mockups.
    - e. Fabrication.
    - f. Sample testing.
    - g. Deliveries.
    - h. Installation.
    - i. Tests and inspections.
    - j. Adjusting.
    - k. Curing.
    - l. Building flush-out.
    - m. Startup and placement into final use and operation.
  8. Construction Areas: Identify each major area of construction for each major portion of the Work. Indicate where each construction activity within a major area must be sequenced or integrated with other construction activities to provide for the following:
    - a. Completion of underground work.
    - b. Structural completion.

- c. Temporary enclosure and space conditioning.
  - d. Permanent space enclosure.
  - e. Completion of mechanical installation.
  - f. Completion of electrical installation.
  - g. Substantial Completion.
- D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion
- E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
- 1. Unresolved issues.
  - 2. Unanswered Requests for Information.
  - 3. Rejected or unreturned submittals.
  - 4. Notations on returned submittals.
  - 5. Pending modifications affecting the Work and Contract Time.
- F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule. Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

### 2.3 STARTUP CONSTRUCTION SCHEDULE

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

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

- A. CPM Schedule: Prepare Contractor's construction schedule using a time-scaled CPM network analysis diagram for the Work.
- 1. Develop network diagram in sufficient time to submit CPM schedule so it can be accepted for use no later than 60 days after date established for the Notice to Proceed.
    - a. Failure to include any work item required for performance of this Contract shall not excuse Contractor from completing all work within applicable completion dates, regardless of Architect's approval of the schedule.
  - 2. Establish procedures for monitoring and updating CPM schedule and for reporting progress. Coordinate procedures with progress meeting and payment request dates.
  - 3. Contract time is calendar days. Schedule shall indicate calendar time. Use "one workday" as the unit of time for individual activities. Indicate nonworking days and holidays incorporated into the schedule in order to coordinate with the Contract Time.
- B. CPM Schedule Preparation: Prepare a list of all activities required to complete the Work.
- 1. Activities: Indicate the estimated time duration, sequence requirements, and relationship of each activity in relation to other activities. Include estimated time frames for the following activities:
    - a. Preparation and processing of submittals.
    - b. Mobilization and demobilization.

- c. Purchase of materials.
  - d. Delivery.
  - e. Fabrication.
  - f. Utility interruptions.
  - g. Installation.
  - h. Work by Owner that may affect or be affected by Contractor's activities.
  - i. Testing.
  - j. Punch list and final completion.
  - k. Activities occurring following final completion.
2. Critical Path Activities: Identify critical path activities, including those for interim completion dates. Scheduled start and completion dates shall be consistent with Contract milestone dates.
  3. Processing: Process data to produce output data on a computer-drawn, time-scaled network. Revise data, reorganize activity sequences, and reproduce as often as necessary to produce the CPM schedule within the limitations of the Contract Time.
  4. Format: Mark the critical path. Locate the critical path near center of network; locate paths with most float near the edges.
- C. Contract Modifications: For each proposed contract modification and concurrent with its submission, prepare a time-impact analysis using a network fragment to demonstrate the effect of the proposed change on the overall project schedule.
- D. Initial Issue of Schedule: Prepare initial network diagram from a sorted activity list indicating straight "early start-total float." Identify critical activities. Prepare tabulated reports showing the following:
1. Contractor or subcontractor and the Work or activity.
  2. Description of activity.
  3. Main events of activity.
  4. Immediate preceding and succeeding activities.
  5. Early and late start dates.
  6. Early and late finish dates.
  7. Activity duration in workdays.
  8. Total float or slack time.
  9. Average size of workforce.
- E. Schedule Updating: Concurrent with making revisions to schedule, prepare tabulated reports showing the following:
1. Identification of activities that have changed.
  2. Changes in early and late start dates.
  3. Changes in early and late finish dates.
  4. Changes in activity durations in workdays.
  5. Changes in the critical path.
  6. Changes in total float or slack time.
  7. Changes in the Contract Time.

## 2.5 REPORTS

- A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
1. List of subcontractors at Project site.
  2. High and low temperatures and general weather conditions.
  3. Accidents.
  4. Stoppages, delays, shortages, and losses.
  5. Meter readings and similar recordings.
  6. Orders and requests of authorities having jurisdiction.
  7. Services connected and disconnected.
  8. Equipment or system tests and startups.

9. Substantial Completions authorized.

### PART 3 - EXECUTION

#### 3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

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

END OF SECTION 01 32 00

SECTION 01 33 00

SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
- B. Related Requirements:
  - 1. Section 01 29 00 "Payment Procedures" for submitting Applications for Payment and the schedule of values.
  - 2. Section 01 32 00 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
  - 3. Section 01 78 23 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
  - 4. Section 01 78 39 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
  - 5. Section 01 79 00 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and

delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.
  - a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.
4. Format: Arrange the following information in a tabular format:
  - a. Scheduled date for first submittal.
  - b. Specification Section number and title.
  - c. Submittal category: Action; informational.
  - d. Name of subcontractor.
  - e. Description of the Work covered.
  - f. Scheduled date for Architect's final release or approval.
  - g. Scheduled date of fabrication.
  - h. Scheduled dates for purchasing.
  - i. Scheduled dates for installation.
  - j. Activity or event number.

#### 1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

- A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals contingent on the execution of the "Electronic Media Disclosure Agreement and the A/E Model Disclose Agreement after this Section.
- B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
  1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
  2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
  3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.
  4. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
    - a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.
- C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect's receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.
  1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

#### SUBMITTAL PROCEDURES

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
  3. Resubmittal Review: Allow 15 days for review of each resubmittal.
  4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.
  5. Concurrent Consultant Review: Where the Contract Documents indicate that submittals may be transmitted simultaneously to Architect and to Architect's consultants, allow 15 days for review of each submittal. Submittal will be returned to Architect before being returned to Contractor.
- D. Paper Submittals: Paper (hardcopy) submittals are unacceptable and will be discarded without review.
- E. Electronic Submittals: Submittals, including shop drawings, shall be by e-mail. Identify and incorporate information in each electronic submittal file as follows:
1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
  2. Name file with submittal number or other unique identifier, including revision identifier.
  3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.
  4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
    - a. Project name.
    - b. Date.
    - c. Name and address of Architect.
    - d. Name of Construction Manager.
    - e. Name of Contractor.
    - f. Name of firm or entity that prepared submittal.
    - g. Names of subcontractor, manufacturer, and supplier.
    - h. Category and type of submittal.
    - i. Submittal purpose and description.
    - j. Specification Section number and title.
    - k. Specification paragraph number or drawing designation and generic name for each of multiple items.
    - l. Drawing number and detail references, as appropriate.
    - m. Location(s) where product is to be installed, as appropriate.
    - n. Related physical samples submitted directly.
    - o. Indication of full or partial submittal.
    - p. Transmittal number, numbered consecutively.
    - q. Submittal and transmittal distribution record.
    - r. Other necessary identification.
    - s. Remarks.
  5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
    - a. Project name.
    - b. Number and title of appropriate Specification Section.
    - c. Manufacturer name.
    - d. Product name.
- F. Options: Identify options requiring selection by Architect.
- G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

- H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
  - 1. Note date and content of previous submittal.
  - 2. Note date and content of revision in label or title block and clearly indicate extent of revision.
  - 3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.
- I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.
- J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

## PART 2 - PRODUCTS

### 2.1 SUBMITTAL PROCEDURES

- A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.
  - 1. Submit electronic submittals (including shop drawings) via email as PDF electronic files.
    - a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.
  - 2. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
- B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.
  - 1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.
  - 2. Mark each copy of each submittal to show which products and options are applicable.
  - 3. Include the following information, as applicable:
    - a. Manufacturer's catalog cuts.
    - b. Manufacturer's product specifications.
    - c. Standard color charts.
    - d. Statement of compliance with specified referenced standards.
    - e. Testing by recognized testing agency.
    - f. Application of testing agency labels and seals.
    - g. Notation of coordination requirements.
    - h. Availability and delivery time information.
  - 4. For equipment, include the following in addition to the above, as applicable:
    - a. Wiring diagrams showing factory-installed wiring.
    - b. Printed performance curves.
    - c. Operational range diagrams.
    - d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.
  - 5. Submit Product Data before or concurrent with Samples.
  - 6. Submit Product Data in the following format:

- a. PDF electronic file.
- C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.
- 1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
    - a. Identification of products.
    - b. Schedules.
    - c. Compliance with specified standards.
    - d. Notation of coordination requirements.
    - e. Notation of dimensions established by field measurement.
    - f. Relationship and attachment to adjoining construction clearly indicated.
    - g. Seal and signature of professional engineer if specified.
  - 2. Submit Shop Drawings in the following format:
    - a. PDF electronic file.
- D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.
- 1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
  - 2. Identification: Attach label on unexposed side of Samples that includes the following:
    - a. Generic description of Sample.
    - b. Product name and name of manufacturer.
    - c. Sample source.
    - d. Number and title of applicable Specification Section.
    - e. Specification paragraph number and generic name of each item.
  - 3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
  - 4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
    - a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    - b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.
  - 5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
    - a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.
  - 6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

- a. Number of Samples: Submit two sets of Samples. Architect will retain one Sample sets; remainder will be returned.
    - 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 two sets of paired units that show approximate limits of variations.
  
- E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:
  - 1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
  - 2. Manufacturer and product name, and model number if applicable.
  - 3. Number and name of room or space.
  - 4. Location within room or space.
  - 5. Submit product schedule in the following format:
    - a. PDF electronic file.
  
- F. Coordination Drawing Submittals: Comply with requirements specified in Section 01 31 00 "Project Management and Coordination."
  
- G. Contractor's Construction Schedule: Comply with requirements specified in Section 01 32 00 "Construction Progress Documentation."
  
- H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 29 00 "Payment Procedures."
  
- I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 40 00 "Quality Requirements."
  
- J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 77 00 "Closeout Procedures."
  
- K. Maintenance Data: Comply with requirements specified in Section 01 78 23 "Operation and Maintenance Data."
  
- L. LEED Submittals: Comply with requirements specified in Section 01 81 13 "Sustainable Design Requirements - LEED for New Construction and Major Renovations."
  
- M. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.
  
- N. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.
  
- O. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.
  
- P. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

SUBMITTAL PROCEDURES

- Q. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.
- R. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.
- S. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
- T. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.
- U. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project. Include the following information:
  - 1. Name of evaluation organization.
  - 2. Date of evaluation.
  - 3. Time period when report is in effect.
  - 4. Product and manufacturers' names.
  - 5. Description of product.
  - 6. Test procedures and results.
  - 7. Limitations of use.
- V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.
- W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.
- X. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.
- Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

## 2.2 DELEGATED-DESIGN SERVICES

- A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.
  - 1. If criteria indicated are not sufficient to perform services or certification required, submit a written request for additional information to Architect.
- B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.

## PART 3 - EXECUTION

### 3.1 CONTRACTOR'S REVIEW

- A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
- B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 77 00 "Closeout Procedures."
- C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

### 3.2 ARCHITECT'S ACTION

- A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action, as follows:
  1. Final Unrestricted Release: Where submittals are marked "Approved," that part of the Work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.
  2. Final-But-Restricted Release: When submittals are marked "Approved as Noted," that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.
  3. Returned for Resubmittal: When submittal is marked "Revise and Resubmit," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.
    - a. Do not permit submittals marked "Revise and Resubmit" to be used at the Project site, or elsewhere where Work is in progress.
  4. Unacceptable Submittal: When submittal is marked "Rejected," do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. The product or work indicated in the submittal does not conform to the requirements of the Contract Documents or is substandard. Prepare a new submittal in accordance with the Contract Documents.
    - a. Do not permit submittals marked "Rejected" to be used at the Project site, or elsewhere where Work is in progress.
  5. Other Action: Where a submittal is primarily for record purposes, special processing or other activity, the submittal will be returned, marked "Action Not Required".
- B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

- C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.
- D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
- E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 01 33 00

SECTION 01 40 00

QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for quality assurance and quality control.
- B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.
  - 1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
  - 2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
  - 3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.
- C. Work performed on or within the boundaries of the Northern Arizona University campus shall be subject to special inspections, periodic inspections, Code compliance inspections, and pre-occupancy or final inspections by the following agencies as applicable:
  - 1. State Fire Marshal's Office (Fire alarm, sprinkler systems, underground fire lines and automatic extinguishing systems).
  - 2. Arizona Corporation Commission (Gas line installation).
  - 3. State Risk Management Division.
  - 4. City of Flagstaff (for utilities installations that cross campus boundaries).
  - 5. State Elevator Inspector (Elevator installations).
  - 6. State Boiler Inspector (Boiler installations).
  - 7. NAU Facility Services, Planning, Design and Construction.
  - 8. NAU Facility Services, Operations / Maintenance Inspectors.
  - 9. NAU Facility Services, Lead Building Inspector.
  - 10. NAU Office of Regulatory Compliance.
  - 11. NESHAP
- D. Provide a complete copy of the construction plans, specifications and other pertinent documents as necessary for review and approval by the NAU Fire Life Safety Division (FLS) and NAU Lead Building Inspector.
- E. Construction shall not commence until the Contractor receives from NAU-FLS and NAU Lead Building Inspector the approved stamped copy of the construction plans, permit, and other documents provided.
- F. Contractor shall be responsible for performing all tests, unless noted otherwise.

- G. Code Conformance: If a conflict is found between a Code requirement and information given in written or graphic specifications, Contractor will abide by the more stringent of the two. Such conflict shall be reported in writing to the Architect, to NAU FLS Division and NAU Lead Building Inspector.
- H. Make utility staking requests for the project to both Bluestake Central at 1-800-STAKE-IT and Facility Services at 523-4227. Requests are given a log number. Maintain that number for future reference.
- I. Testing and Inspection Services: Reinforcing steel or structural framework of any part of any building or structure shall not be covered or concealed without first obtaining approval of the Architect.
  - 1.
  - 2. Foundation Inspection: Shall be made after excavations for footings are complete and any required reinforcing steel is in place. For concrete foundations, any required forms shall be in place prior to inspection.
  - 3. Concrete Slab or Under-Floor Inspection: Shall be made after all in-slab or under-floor building service equipment, conduit, piping accessories and other ancillary equipment items are in place, but before any concrete is placed or floor sheathing installed, including the sub-floor.
  - 4. Frame and Rough-In Mechanical, Plumbing and Electrical Inspection: Shall be made after the roof, structural framing, fire blocking and bracing are in place and pipes, and vents are complete and the rough electrical, plumbing, and heating, pipes and ducts, and fire sprinkler piping are approved.
  - 5. Gypsum Board Inspection: Shall be made after l lathing and gypsum board, interior and exterior, is in place but before any plastering is applied or before gypsum board joints and fasteners are taped and finished.
  - 6. Substantial Completion Inspection: Prior to issuance of the Substantial Completion Certificate, in-progress inspections shall be passed. Schedule a walkthrough with each trade inspector individually to sign off on substantial completion provide a punch list.
  - 7. Final Completion Inspection: Prior to Final Payment schedule an additional walk with each trade inspector to ensure that punch work is completed and inspected, and required inspections are passed.
- J. Related Sections include the following:
  - 1. Division 01 Section "Construction Progress Documentation" for developing a schedule of required tests and inspections.
  - 2. Division 01 Section "Cutting and Patching" for repair and restoration of construction disturbed by testing and inspecting activities.
  - 3. Divisions 02 through 49 Sections for specific test and inspection requirements.

### 1.3 DEFINITIONS

- A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.
- B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.
- C. 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. Laboratory Mockups: Full-size, physical assemblies that are constructed at testing facility to verify performance characteristics.

- E. 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.
- F. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with industry standards.
- G. Source Quality-Control Testing: Tests and inspections that are performed at the source, i.e., plant, mill, factory, or shop.
- H. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.
- I. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
- J. 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.
- K. 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.

#### 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 for a decision before proceeding.
- B. Minimum Quantity or Quality Levels: The quantity or quality level shown or specified shall be the minimum provided or performed. The actual installation may comply exactly with the minimum quantity or quality specified, or it may exceed the minimum within reasonable limits. To comply with these requirements, indicated numeric values are minimum or maximum, as appropriate, for the context of requirements. Refer uncertainties to Architect for a decision before proceeding.

#### 1.5 SUBMITTALS

- A. Qualification Data: For testing agencies specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include proof of qualifications in the form of a recent report on the inspection of the testing agency by a recognized authority.
- B. 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.

- C. Permits, Licenses, and Certificates: For Owner's records, submit copies of permits, licenses, certifications, inspection reports, releases, jurisdictional settlements, notices, receipts for fee payments, judgments, correspondence, records, and similar documents, established for compliance with standards and regulations bearing on performance of the Work.

## 1.6 QUALITY ASSURANCE

- A. General: Qualifications paragraphs in this Article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.
- 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 jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar 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: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 548; and with additional qualifications specified in individual Sections; and where required by authorities having jurisdiction, that is acceptable to authorities.
- 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 site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
  - e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
  - f. When testing is complete, remove test specimens, assemblies, 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, 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: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
- 1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
  - 2. Notify Architect 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's approval of mockups before starting work, fabrication, or construction.
    - a. Allow seven days for initial review and each re-review of each mockup.
  - 5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
  - 6. Demolish and remove mockups when directed, unless otherwise indicated.

## 1.7 QUALITY CONTROL

- A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
- 1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
  - 2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.
- B. 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 24 hours in advance of time when Work that requires testing or inspecting will be performed.
  - 3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
  - 4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.
- C. **Manufacturer's Field Services:** Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."
- D. **Retesting/Reinspecting:** Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.
- E. **Testing Agency Responsibilities:** Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.
  1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
  2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
  3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
  4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
  5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
  6. Do not perform any duties of Contractor.
- F. **Associated Services:** Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
  1. Access to the Work.
  2. Incidental labor and facilities necessary to facilitate tests and inspections.
  3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
  4. Facilities for storage and field curing of test samples.
  5. Delivery of samples to testing agencies.
  6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
  7. Security and protection for samples and for testing and inspecting equipment at Project site.
- G. **Coordination:** Coordinate sequence of activities to accommodate required quality-assurance and -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.

## 1.8 SPECIAL TESTS AND INSPECTIONS

- A. **Special Tests and Inspections:** Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:
  1. 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 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 with copy to Contractor and to authorities having jurisdiction.
  4. Submitting a final report of special tests and inspections at Substantial Completion, that includes a list of unresolved deficiencies.

5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 TEST AND INSPECTION LOG

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

### 3.2 REPAIR AND PROTECTION

- A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.
  1. Provide materials and comply with installation requirements specified in other Specification Sections. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible.
  2. Comply with the Contract Document requirements for Division 01 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.

END OF SECTION 01 40 00

SECTION 01 42 00

REFERENCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

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

1.3 INDUSTRY STANDARDS

- A. Applicability of Standards: Unless the Contract Documents include more stringent requirements, applicable construction industry standards have the same force and effect as if bound or copied directly into the Contract Documents to the extent referenced. Such standards are made a part of the Contract Documents by reference.
- B. Publication Dates: Comply with standards in effect as of date of the Contract Documents unless otherwise indicated.

- C. Copies of Standards: Each entity engaged in construction on Project should be familiar with industry standards applicable to its construction activity. Copies of applicable standards are not bound with the Contract Documents.
  - 1. Where copies of standards are needed to perform a required construction activity, obtain copies directly from publication source.

1.4 ABBREVIATIONS AND ACRONYMS

- A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities indicated in Thomson Gale's "Encyclopedia of Associations" or in Columbia Books' "National Trade & Professional Associations of the U.S."
- B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list. Names, telephone numbers, and Web sites are subject to change and are believed to be accurate and up-to-date as of the date of the Contract Documents.

ICC	International Code Council www.iccsafe.org	(888) 422-7233
ICC-ES	ICC Evaluation Service, Inc. www.icc-es.org	(800) 423-6587 (562) 699-0543
UBC	Uniform Building Code (See ICC)	

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 42 00

SECTION 01 43 00

CONTRACTOR'S QUALITY ASSURANCE PROGRAM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. The Contractor is responsible for implementing a Quality Assurance Program that will ensure quality work as well as the timely and cost-effective completion of this project. This program shall not rely on observations or inspections made by representatives of the Owner, the Authority having jurisdiction, the Architect, manufacturers, suppliers, subcontractors or others. Such inspections and tests do not relieve Contractor of responsibility for providing materials and fabrication procedures in compliance with specified requirements.
- B. The Contractor's Quality Assurance Program shall:
  - 1. Check quality of Work.
  - 2. Resolve disputes between trades, subcontractors and other entities working directly or indirectly for the Contractor.
  - 3. Guard against flaws.
  - 4. Verify Completeness of Work.

1.3 SUPERVISION

- A. Contractor shall supervise subcontractors and take an active role in assuring the best quality of work from all trades for this project.
- B. Verify that applications for permits, inspections, temporary facilities and permanent utilities are processed in a timely fashion.
- C. Unless otherwise indicated or specified; locate, identify, protect and maintain existing water, gas, sewer, irrigation and storm drain lines; lighting, power and telephone conduits and wires; and other existing surface or subsurface structures. Do not disturb, disconnect or damage these improvements during progress of Work. Maintain existing plants and trees which are to remain. Contractor shall repair or replace, at his expense, damage to existing improvements, and to adjacent property or rights-of-way, resulting directly or indirectly from his operations.
  - 1. Damage resulting directly or indirectly from the operations of the Contractor or subcontractors shall be corrected, repaired or replaced to the satisfaction of the Owner and at no cost to the Owner.
- D. Resolve conflicts that may develop among subcontractors and vendors and others over limits of the Agreements between the Contractor and subcontractors or suppliers.

1.4 DOCUMENT REVIEW

- A. The Contract documents have been checked by the Owner's representatives, the Authority having jurisdiction, Contractor and the Architect, and to the best of their knowledge and belief are reasonably

free from errors, omissions, conflicts, inconsistencies, code violations and improper use of materials. To identify any problems that may remain in the Contract Documents, and to expedite their resolution, the Contractor shall perform the following procedures:

1. Carefully study and compare the Contract Documents and at once report in writing to the Architect errors, omissions, conflicts, inconsistencies, code violations or improper use of materials discovered. If no report is received within 60 days of the Contract date, it will be assumed that no errors, omissions, conflicts, inconsistencies, code violations or improper use of materials were discovered.
2. Require each subcontractor to read and comply with the requirements of this Section. Compliance with these requirements does not obligate the Contractor, or subcontractors, to correct the problems that are identified without written instructions from the Owner.

## 1.5 IN PROGRESS INSPECTION AND TESTING

A. Inspection Plan: The Contractor and his designated Quality Control Representative will use a comprehensive inspection plan for each separate feature of work to be performed under this contract; i.e. work described by each division / section of the technical provision section of the specifications. The minimum plan shall include the following:

1. Preparatory Inspection: Contractor and applicable Subcontractors will thoroughly review the contract documents.
2. Discuss and review with your forces and the sub trades associated with the work, the steps essential to achieving the standards of quality identified in the contract documents.
3. Study the contract documents including details and associated work of other trades. Prepare and receive answers to RFI'S for the given scope of work.
4. Prior to ordering materials or performing work, prepare & submit shop drawings. (Proceed with work only after receiving Reviewed shop drawings from the Architect).
5. Prepare coordination drawings for applicable trades. (Proceed with work only after receiving Reviewed coordination drawings from the Architect).
6. Prior to ordering materials or performing work, prepare and receive acceptance of Building System Mock-ups prior to starting any installation.
7. Check availability of materials and equipment to be used.
8. Review safety and environmental standards prior to commencing work.
9. Establish the Pre Installation construction meeting date and list of construction personnel attendees. A specific agenda for each required meeting should be generated by the Contractor. The agenda should be issued to the attendees no later than 7 days prior to the established meeting date.
10. Attend the Pre-installation construction meeting(s). The Contractor will chair the meeting and document the decisions.
11. Develop Issues Log and resolve issues prior to start of construction.
12. Prior to ordering materials, secure necessary approval of inspection and test reports of materials and equipment to be utilized.
13. Carefully layout the work, mindful of associated trades, rough ins, exposure to damage.
14. Prior to ordering materials, verify that the layout is correct or resolve any layout conflicts thru the RFI process prior to starting construction.
15. Carefully protect the layout from exposure to damage.
16. Review materials and articles utilized for adequacy, operability and cleanliness.

B. Follow up inspection:

1. The Contractor's quality control representative shall do daily inspection(s) to assure the continuing conformance of the work to the standards established during the preparatory and initial inspections.
2. The Contractor's daily log should state the status of the quality of the work being installed.
3. During installation of work protect work from damage of other trades, equipment and weather.
4. Exercise care in removing construction support, such as formwork, scaffolding, braces, and other associated removal to ensure quality of finished product.

5. Contractor shall perform an inspection, develop a list, and propose a schedule for correction of any deficiencies. Non conforming work shall be identified and corrected prior to the commencement of the next operation, at no cost to the Owner.
6. Where applicable, Contractor shall secure the Inspections from the authorities having jurisdiction, and shall prepare a schedule of corrective action.
7. Notify the Architect and Owner to review the completed work.
8. Following completion of work, perform the necessary steps necessary to protect and maintain the integrity of the finished product until final acceptance.

END OF SECTION 01 43 00

## SECTION 01 50 00

### TEMPORARY FACILITIES AND CONTROLS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division 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 01 Section "Summary" for limitations on utility interruptions and other work restrictions.
  - 2. Division 01 Section "Submittal Procedures" for procedures for submitting copies of implementation and termination schedule and utility reports.
  - 3. Division 01 Section "Execution Requirements" for progress cleaning requirements.
  - 4. Divisions 02 through 33 Sections for temporary heat, ventilation, and humidity requirements for products in those Sections.
  - 5. Division 02 Section "Termite Control" for pest control.

##### 1.3 USE CHARGES

- A. General: Cost or use charges for temporary facilities shall be included in the Contract Sum. Allow other entities to use temporary services and facilities without cost, including, but not limited to, Owner's construction forces, Architect, testing agencies, and authorities having jurisdiction.
- B. Sewer Service: Pay sewer service use charges for sewer usage by all entities for construction operations.
- C. Water Service: Pay water service use charges for water used by all entities for construction operations.
- D. Electric Power Service: Pay electric power service use charges for electricity used by all entities for construction operations.

##### 1.4 SUBMITTALS

- A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
- B. Provide a staging plan/site logistic plan at the preconstruction meeting. The staging plan shall clearly identify the following items:
  - 1. Construction Trailer.
  - 2. Material Staging.
  - 3. Wash down areas (concrete, mud, etc.).
  - 4. Dumpsters.
  - 5. Traffic Control including signals and barricades.
  - 6. Signage.
  - 7. Site Fencing including gate locations and height of the fence.

8. Site Access for contractors, material delivery and waste hauling.
9. Sanitary Facilities.
10. Temporary Utilities.
11. Temporary Parking.
12. SWPPP measures.
13. ADA accessible routes.
14. Pedestrian/bikes routes.
15. Vehicle routes.
16. Emergency Access

#### 1.5 QUALITY ASSURANCE

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

#### 1.6 PROJECT CONDITIONS

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

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Chain-Link Fencing: Minimum 2-inch, 0.148-inch- thick, galvanized steel, chain-link fabric fencing; minimum 6 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 rails.
- B. Lumber and Plywood: Comply with requirements in Division 6 Section "Rough Carpentry."
- C. Paint: Comply with requirements in Division 9 painting Sections.

#### 2.2 TEMPORARY FACILITIES

- A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading.
- B. Common-Use Field Office: Of sufficient size to accommodate needs of construction personnel. Keep office clean and orderly. Furnish and equip offices as follows:
  1. Furniture required for Project-site documents including file cabinets, plan tables, plan racks, and bookcases.
  2. Conference room of sufficient size to accommodate meetings of 15 individuals. Provide electrical power service and 120-V ac duplex receptacles, with not less than 1 receptacle on each wall. Furnish room with conference table, chairs, and 4-foot- square tack board.
  3. Drinking water and private toilet.
  4. Coffee machine and supplies.
  5. Heating and cooling equipment necessary to maintain a uniform indoor temperature of 68 to 72 deg F.
  6. Lighting fixtures capable of maintaining average illumination of 20 fc at desk height.

## 2.3 EQUIPMENT

- A. Fire Extinguishers: Portable, UL rated; with class and extinguishing agent as required by locations and classes of fire exposures.
- B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.
  - 1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.
  - 2. Heating 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. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return air grille in system and remove at end of construction.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

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

### 3.2 TEMPORARY FACILITIES

- A. Provide temporary adequate light and power supply for construction, making all necessary arrangements with serving utility and paying all expenses in connection therewith. Temporary lighting illumination level shall be adequate to permit workmen to properly perform their work.
- B. Provide temporary adequate water supply for construction, making all necessary arrangements with serving utility and paying all expenses in conjunction therewith.
- C. Supply adequate cool, pure drinking water with individual drinking cups or sanitary bubbler fountain for the use of employees on the project. The quality of the drinking water shall meet the standards for public water supplies of the Coconino County Health Department.
- D. Provide and pay for installation of a job telephone, paying local service charges involved, for the duration of the Contract.
- E. Provide proper sanitary and adequate toilet facilities for the use of workers employed on the Project, located where directed, and enforce their use by personnel on the project. Enclose and weatherproof toilets and keep in a sanitary condition at all times.
- F. Provide adequate fire extinguishers on the premises during the course of construction, of the type and sizes recommended by the NFPA to control fires resulting from the particular work being performed.
- G. Provide and maintain fences, barricades, lights, shoring and other protective structures or devices necessary for the safety of workmen, equipment, the public and property as required by state or municipal laws and regulations, and local ordinances, laws and other requirements of the county, state and other authorities having jurisdiction with regard to safety precautions, operations and fire hazards.
- H. Provide and maintain pumping facilities, including power for keeping the site, excavations and structure free from accumulations of water, whether from underground seepage, rainfall, drainage or broken lines.

- I. Provide security fencing acceptable to Owner around the construction area. Fencing shall be erected and secured in manner to withstand the forces to which it may be subjected.
- J. Protect stored elements of construction from any danger of damage from wind, rain, dust, frost, or other infiltration of weather.
- K. Exercise all possible care to control excessive noise and dust during the construction to keep these problems to a minimum. Dust control is the Contractor's responsibility at no additional cost to NAU. The Contractor shall address complaints regarding dust control within four (4) hours. Air, water, surface, and subgrade conditions shall be protected from pollution by the Contractor. Such protection requirements as detailed in all State and Federal regulations shall apply. ADEQ, OSHA, and NAU Office of Regulatory Compliance may inspect for compliance without notice.
- L. Furnish and erect, where directed, a project sign, the design shall be obtained from the Architect, painted 2 coats of paint, giving the name of the Project Owner, Architects, Engineers and Contractor. Sign painting shall involve 4 colors of paint. No other signs will be permitted on the Project Site. Sign shall meet NAU requirements for temporary signs.
- M. Provide and maintain a weather tight office for the use of NAU, Architect, and Contractor. This office shall be provided with windows which operate and doors with locks, tables, benches, racks for Drawings, electric lights, and telephones and shall be heated.
- N. Temporary Access Roads: Optimum truck routes and access roads, including fire department access, to the Project site shall be identified at the pre-construction conference and noted in the site logistics plan.
- O. Vehicles parking within campus boundaries shall display permits. Vehicles without permits will be ticketed by the NAU Police Department. Vehicles parked within the fenced staging / storage area, identified on the Construction Documents, do require parking permits. Contractor shall make a written request to the NAU representative at the preconstruction meeting for parking permits for all vehicles to be parked within the campus boundaries. NAU Parking Services will attempt to meet requests for specific parking areas, however, due to availability; alternative parking areas may be assigned. Storage / Staging areas shall be requested in writing to the NAU representative prior to the start of construction.
- P. Traffic Control: Coordinate with the Facility Services Project Manager and obtain approval from: NAU Parking Services, NAU Shuttle Services, NAU Police Department, NAU Fire Marshal, NAU Office of Regulatory Compliance and City of Flagstaff Fire Department.
- Q. Staging Areas: Submit a site logistics plan at the preconstruction meeting. Storage / Staging Areas shall be maintained and returned to the condition they were in prior to occupation by the Contractor. Patch, repair or replace damaged areas upon completion of the work. The area shall receive final inspection and approval by NAU prior to final payment.
- R. Temporary Tree and Plant Protection: Existing trees and plants indicated to remain shall be fenced outside the drip line (this includes memorial trees). Construction activity shall not occur within fenced area. Provide site maintenance and control of erosion, weeds, snow, debris, etc. Irrigation is not a standard part of the blue stake procedure. The contractor is responsible for coordinating with NAU Grounds to determine location of irrigation lines prior to start of construction. The contractor shall be responsible for relocating/repairing any irrigation equipment.

### 3.3 TEMPORARY UTILITY INSTALLATION

- A. General: Install temporary service or connect to existing service.
  - 1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.
- B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.
  - 1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

- C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.
- D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.
  - 1. Toilets: Use of Owner's existing toilet facilities will be permitted, as long as facilities are cleaned and maintained in a condition acceptable to Owner. At Substantial Completion, restore these facilities to condition existing before initial use.
- E. 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.
- F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.
- G. Electric Power Service: Provide electric power service and distribution system of sufficient size, capacity, and power characteristics required for construction operations.
  - 1. Install electric power service underground, unless otherwise indicated.
  - 2. Connect temporary service to Owner's existing power source, as directed by Owner.
- H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.
  - 1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system.
- I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one telephone line(s) for each field office.
  - 1. 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 one telephone line(s) for Owner's use.
  - 2. At each telephone, post a list of important telephone numbers.
    - a. Police and fire departments.
    - b. Ambulance service.
  - 3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

### 3.4 SUPPORT FACILITIES INSTALLATION

- 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. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.
- B. Parking: Provide temporary parking areas for construction personnel.
- C. Project Identification and Temporary Signs: Provide Project identification and other signs. Install signs where indicated 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.
  3. Individual signs identifying subcontractor will not be permitted except subcontractors may have signs on vehicles and trailers.
- D. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with Division 1 Section "Execution Requirements" for progress cleaning requirements.
- E. 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 acceptance.

### 3.5 SECURITY AND PROTECTION FACILITIES INSTALLATION

- A. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.
1. Comply with work restrictions specified in Division 1 Section "Summary."
- B. Temporary Erosion and Sedimentation Control: 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- and sedimentation-control measures during construction until permanent vegetation has been established.
- C. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.
1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.
  2. Maintain security by limiting number of keys and restricting distribution to authorized personnel. Provide Owner and Architect with one set of keys each.
- D. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.
- E. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241.
1. Prohibit smoking in hazardous fire-exposure areas.
  2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.
  3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

4. Provide temporary standpipes and hoses for fire protection. Hang hoses with a warning sign stating that hoses are for fire-protection purposes only and are not to be removed. Match hose size with outlet size and equip with suitable nozzles.

### 3.6 OPERATION, TERMINATION, AND REMOVAL

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

END OF SECTION 01 50 00

SECTION 01 57 23

TEMPORARY STORM WATER POLLUTION CONTROL

1.1 NPDES COMPLIANCE REQUIREMENT

- A. Although this project may not be of sufficient size to require compliance with the National Pollutant Discharge Elimination System requirements for erosion control during construction, provide a Storm Water Pollution Prevention Plan (SWPPP) for the project. Implement the SWPPP, including verification of compliance form.
- B. Implement the SWPPP at the onset of rainfall, such that 80 percent of the construction related sediment which is generated from storm water runoff within the project site is eliminated.
- C. Revise the SWPPP as necessary throughout the duration of the Contract. Submit revisions to the SWPPP to NAU for approval prior to implementation.

1.2 NPDES COMPLIANCE

- A. Furnish all materials, labor, and equipment necessary to comply with all National Pollutant Discharge Elimination System (NPDES) requirements for erosion control during construction, as specified under the Environmental Protection Agency (EPA) General Permit for Arizona.
- B. Work shall include providing, installing, maintaining, removing and disposing of erosion control measures such as gravel filter berms, dikes, catch basin inlet protection, end-of pipe filtering devices, silt fences, dams, sediment basins, netting, straw bale barriers, slope drains, and other erosion control devices or methods.
- C. This work shall include preparing and revising as necessary a comprehensive storm water pollution prevention plan, including descriptions of proposed measures to be implemented; a schedule detailing the proposed coordination for accomplishing the erosion control features in a timely and appropriate manner; and site-specific diagrams indicating proposed locations where erosion control devices or measures may be required during successive construction stages.
- D. Contractor shall be designated as permittee, and shall eliminate a minimum of 80 percent of the construction related sediment resulting from storm water runoff from the project.
- E. All subcontractors shall comply with the requirements of the NPDES under the supervision of the Contractor. All subcontractors shall submit a completed, signed sub-contractor certification form, thereby designating themselves as co-permittees.
- F. Contractor shall complete the following documents:
  - 1. Storm Water Pollution Prevention Plan (SWPPP) for the project. The Contractor shall implement the SWPPP, including verification of compliance form.
  - 2. Notice of Intent (NOI) to be covered by NPDES General Permit for Arizona, including certification of signature.
  - 3. Contractor/Subcontractor Certification.
  - 4. Inspection and Maintenance Reports.
  - 5. Notice of Termination (NOT) of coverage under NPDES General Permit.
- G. Contractor (and all other co-permittees) shall submit completed, signed NOI forms at least 48 hours prior to the notice to proceed date on the project to the EPA at the following address:

EPA Storm Water Notice of Intent  
P.O. Box 1215  
Newington, VA 22122

- H. If the Contractor, or its subcontractors, fails to provide the required submissions within the specified time frame, the Owner will order the preconstruction conference suspended, or suspend the Work until such time as they are furnished, The Contractor shall not be entitled to additional compensation or an additional extension of contract time resulting from delays due to a suspension.
- I. The NOI shall be posted on the construction site along. The SWPPP shall be made available on site during the entire construction period.
- J. A copy of the NOI shall be sent to:  
Storm Water Coordinator, ADEQ  
P.O. Box 600  
Phoenix, Arizona 85001-0600
- K. Contractor shall be prepared to implement the SWPPP at the onset of any rainfall, such that 80 percent of the construction related sediment which is generated from storm water runoff within the project site is eliminated.
- L. Contractor shall maintain all related construction elements in proper working order, including cleaning and repair. No separate payment will be made for such inspections, cleaning, or repair.
- M. Contractor shall revise the SWPPP as necessary throughout the duration of the Contract, in order to assure compliance with the EPA permit requirements. The Contractor shall submit revisions to the SWPPP to the owner for approval prior to implementation.
- N. Contractor shall perform monthly and major rainfall event inspections in accordance with the requirements of the EPA and document the findings.
- O. The owner will inspect the condition of all measures listed in SWPPP. The Contractor shall provide the Owner with all documents in accordance with the record keeping requirements of the EPA
- P. SWPPP reports required under this Contract shall be available to the public in accordance with the requirements of section 308(b) of the Clean Water Act. The Contractor as a permittee of the construction activities with the storm water discharges covered by the Arizona General Permit shall make plans available to the public upon request through the EPA.
- Q. No condition of the Arizona General Permit as well as the SWPPP shall release the Contractor from any responsibilities or requirements under other environmental statutes or regulations.
- R. The final SWPPP shall be kept on the project site at all times, and shall be retained by the permittee for 3 years following the date that the NOI is sent to the EPA.
- S. Upon final acceptance of work performed by a subcontractor, co-permittee, such subcontractor shall be absolved of any involvement in, or responsibility for, any subsequent NPDES violations on the project by either the Contractor or other subcontractors.
- T. Upon final acceptance, and de-mobilization, the Contractor shall submit a completed and signed NOT form to the EPA, with copies to the Owner, and Agencies who received a copy of NOI, thereby terminating all NPDES permit coverage for the project.
- U. The construction price shall include all work such as design, placement, construction, maintenance, inspection, removal and disposal of all elements required by the NPDES permit coverage. Payment shall be made monthly with equal payment during the entire construction period with 10 percent retention to be paid after filing of NOT. Cost of revision and implementation of SWPPP during construction period being considered as included in the GMP.

- V. No measurement or direct payment will be made for preparing the Storm Water Pollution Prevention Plan (SWPPP), the Notice of Intent (NOI), Notice of termination (NOT), Inspection and Maintenance Report, or other documentation required to perform the Work, the cost being considered as included in the GMP.

END OF SECTION 01 57 23

SECTION 01 60 00

PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for selection of products for use in Project; product delivery, storage, and handling; manufacturers' standard warranties on products; special warranties; product substitutions; and comparable products.
- B. Related Sections include the following:
  - 1. Division 01 Section "References" for applicable industry standards for products specified.
  - 2. Division 01 Section "Closeout Procedures" for submitting warranties for Contract closeout.
  - 3. Divisions 02 through 33 Sections for specific requirements for 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. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.4 SUBMITTALS

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

- c. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
  - d. Samples, where applicable or requested.
  - e. Research/evaluation reports evidencing compliance with building code in effect for Project, from a model code organization acceptable to authorities having jurisdiction.
  - f. Cost information, including a proposal of change, if any, in the Contract Sum.
2. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within 7 days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within 15 days of receipt of request, or 7 days of receipt of additional information or documentation, whichever is later.
- a. Use product specified if Architect cannot make a decision on use of a proposed substitution within time allocated.

## 1.5 QUALITY ASSURANCE

- A. 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.

## 1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

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

## 1.7 PRODUCT WARRANTIES

- A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.
  - 1. Manufacturer's Warranty: 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. Refer to Divisions 2 through 16 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 SUBSTITUTIONS

- A. Timing: Architect will consider requests for substitution if received within 120 days after the Notice to Proceed. Requests received after that time may be considered or rejected at discretion of Architect.
- B. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied. If the following conditions are not satisfied, Architect will return requests without action, except to record noncompliance with these requirements:
  - 1. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.
  - 2. Requested substitution does not require extensive revisions to the Contract Documents.
  - 3. Requested substitution is consistent with the Contract Documents and will produce indicated results.
  - 4. Substitution request is fully documented and properly submitted.
  - 5. Requested substitution will not adversely affect Contractor's Construction Schedule.
  - 6. Requested substitution has received necessary approvals of authorities having jurisdiction.
  - 7. Requested substitution is compatible with other portions of the Work.
  - 8. Requested substitution has been coordinated with other portions of the Work.
  - 9. Requested substitution provides specified warranty.

## PART 3 - EXECUTION (Not Used)

END OF SECTION 01 60 00

SECTION 01 70 00

EXECUTION REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

- 1. Construction layout.
- 2. Field engineering and surveying.
- 3. General installation of products.
- 4. Progress cleaning.
- 5. Starting and adjusting.
- 6. Protection of installed construction.
- 7. Correction of the Work.

- B. Related Sections include the following:

- 1. Division 01 Section "Project Management and Coordination" for procedures for coordinating field engineering with other construction activities.
- 2. Division 01 Section "Submittal Procedures" for submitting surveys.
- 3. Division 01 Section "Cutting and Patching" for procedural requirements for cutting and patching necessary for the installation or performance of other components of the Work.
- 4. Division 01 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.

1.3 SUBMITTALS

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

1.4 QUALITY ASSURANCE

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

PART 2 - PRODUCTS

## 2.1 MATERIALS

- A. General: Comply with requirements specified in other Sections.
  - 1. Use products for patching that comply with requirements in Section 01 81 13 "Sustainable Design Requirements - LEED for New Construction and Major Renovations."

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Existing Conditions: The existence and location of site improvements, utilities, and other construction indicated as existing are not guaranteed. Before beginning work, investigate and verify the existence and location of mechanical and electrical systems and other construction affecting the Work.
  - 1. Before construction, verify the location and points of connection of utility services.
- 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. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
- B. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.
- C. 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. Include a detailed description of problem encountered, together with recommendations for changing the Contract Documents.

### 3.3 CONSTRUCTION LAYOUT

- A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.
- B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.
  2. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.
  3. Inform installers of lines and levels to which they must comply.
  4. Check the location, level and plumb, of every major element as the Work progresses.
  5. Notify Architect when deviations from required lines and levels exceed allowable tolerances.
  6. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.
- C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and invert elevations.
- D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.
- E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

### 3.4 FIELD ENGINEERING

- A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.
1. Do not change or relocate existing benchmarks or control points without prior written approval of Architect. Report lost or destroyed permanent benchmarks or control points promptly. Report the need to relocate permanent benchmarks or control points to Architect before proceeding.
  2. Replace lost or destroyed permanent benchmarks and control points promptly. Base replacements on the original survey control points.
- B. Benchmarks: Establish and maintain a minimum of two permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.
1. Record benchmark locations, with horizontal and vertical data, on Project Record Documents.
  2. Where the actual location or elevation of layout points cannot be marked, provide temporary reference points sufficient to locate the Work.
  3. Remove temporary reference points when no longer needed. Restore marked construction to its original condition.

### 3.5 INSTALLATION

- A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.
1. Make vertical work plumb and make horizontal work level.
  2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.
  3. Conceal pipes, ducts, and wiring in finished areas, unless otherwise indicated.
  4. Maintain minimum headroom clearance of 8 feet in spaces without a suspended ceiling.

- B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.
- C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.
- D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.
- E. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.
- F. 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.
- G. 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.
  - 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.
- H. 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.
- I. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

### 3.6 PROGRESS CLEANING

- A. General: Maintain work and staging areas in a clean and orderly condition to enhance the safety and appearance of the jobsite. Accumulations of refuse will not be permitted except as specifically approved in writing by NAU.
- B. 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.
- C. Site: Maintain Project site free of waste materials and debris.
- D. 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.

- E. 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.
- F. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.
- G. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.
- H. 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.
- I. 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.
- J. 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.
- K. 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.
- L. Clean each surface or item as follows before requesting inspection for certification of Substantial Completion:
  - 1. Remove labels that are not permanent.
  - 2. Clean transparent materials, including mirrors. Remove excess glazing compounds. Replace chipped or broken glass.
  - 3. Clean exposed finishes to a dust-free condition, free of stains, films, and foreign substances. Leave concrete floors broom clean.
  - 4. Vacuum carpeted surfaces and wax resilient flooring.
  - 5. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication. Clean plumbing fixtures. Clean light fixtures and lamps.
  - 6. Clean the site. Sweep paved areas; remove stains, spills, and foreign deposits. Rake grounds to a smooth, even-textured surface.

### 3.7 STARTING AND ADJUSTING

- A. Arrange for each installer of equipment that requires operation and maintenance to provide instruction to Owner's personnel. Include a detailed review of the following:
  - 1. Startup and shutdown.
  - 2. Emergency operations and safety procedures.
  - 3. Noise and vibration adjustments.
  - 4. Maintenance manuals.
  - 5. Spare parts, tools, and materials.
  - 6. Lubricants and fuels.
  - 7. Identification systems.
  - 8. Control sequences.
  - 9. Hazards.
  - 10. Warranties and bonds.
- 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 01 Section "Quality Requirements."

### 3.8 PROTECTION OF INSTALLED CONSTRUCTION

- A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.
- B. Comply with manufacturer's written instructions for temperature and relative humidity.

### 3.9 CORRECTION OF THE WORK

- A. Repair or remove and replace defective construction. Restore damaged substrates and finishes. Comply with requirements in Division 01 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 01 70 00

## SECTION 01 74 19

### CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Salvaging nonhazardous construction waste.
  - 2. Recycling nonhazardous construction waste.
  - 3. Disposing of nonhazardous construction waste.
- B. Related Requirements:
  - 1. Section 02 41 19 "Selective Demolition" for disposition of waste resulting from partial demolition of buildings, structures, and site improvements.
  - 2. Section 04 22 00 "Concrete Unit Masonry" for disposal requirements for masonry waste.
  - 3. Section 31 10 00 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

##### 1.3 DEFINITIONS

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

##### 1.4 PERFORMANCE REQUIREMENTS

- A. General: Achieve end-of-Project rates for salvage/recycling of 75 percent by weight of total non-hazardous solid waste generated by the Work. Practice efficient waste management in the use of materials in the course of the Work. Use all reasonable means to divert construction and demolition waste from landfills and incinerators. Facilitate recycling and salvage of materials.:

## 1.5 ACTION SUBMITTALS

- A. Waste Management Plan: Submit plan within 7 days of date established for the Notice to Proceed.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Waste Reduction Progress Reports: Concurrent with each Application for Payment, submit report. Use Form CWM-7 for construction waste. Include the following information:
  - 1. Material category.
  - 2. Generation point of waste.
  - 3. Total quantity of waste in tons (tonnes).
  - 4. Quantity of waste salvaged, both estimated and actual in tons (tonnes).
  - 5. Quantity of waste recycled, both estimated and actual in tons (tonnes).
  - 6. Total quantity of waste recovered (salvaged plus recycled) in tons (tonnes).
  - 7. Total quantity of waste recovered (salvaged plus recycled) as a percentage of total waste.
- B. Waste Reduction Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates for salvage, recycling, and disposal as a percentage of total waste generated by the Work.
- C. Records of Donations: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt.
- D. Records of Sales: Indicate receipt and acceptance of salvageable waste sold to individuals and organizations. Indicate whether organization is tax exempt.
- E. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- F. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.
- G. LEED Submittal: LEED letter template for Credit MR 2, signed by Contractor, tabulating total waste material, quantities diverted and means by which it is diverted, and statement that requirements for the credit have been met.

## 1.7 QUALITY ASSURANCE

- A. Regulatory Requirements: Comply with hauling and disposal regulations of authorities having jurisdiction.
- B. Waste Management Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination." Review methods and procedures related to waste management including, but not limited to, the following:
  - 1. Review and discuss waste management plan including responsibilities of waste management coordinator.
  - 2. Review requirements for documenting quantities of each type of waste and its disposition.
  - 3. Review and finalize procedures for materials separation and verify availability of containers and bins needed to avoid delays.
  - 4. Review procedures for periodic waste collection and transportation to recycling and disposal facilities.
  - 5. Review waste management requirements for each trade.

## 1.8 WASTE MANAGEMENT PLAN

- A. General: Develop a waste management plan according to ASTM E 1609 and requirements in this Section. Plan shall consist of waste identification, waste reduction work plan, and cost/revenue analysis. Indicate quantities by weight or volume, but use same units of measure throughout waste management plan.
- B. Waste Identification: Indicate anticipated types and quantities of site-clearing and construction waste generated by the Work. Use Form CWM-1 for construction waste. Include estimated quantities and assumptions for estimates.
- C. Waste Reduction Work Plan: List each type of waste and whether it will be salvaged, recycled, or disposed of in landfill or incinerator. Use Form CWM-3 for construction waste. Include points of waste generation, total quantity of each type of waste, quantity for each means of recovery, and handling and transportation procedures.
  - 1. Salvaged Materials for Reuse: For materials that will be salvaged and reused in this Project, describe methods for preparing salvaged materials before incorporation into the Work.
  - 2. Salvaged Materials for Sale: For materials that will be sold to individuals and organizations, include list of their names, addresses, and telephone numbers.
  - 3. Recycled Materials: Include list of local receivers and processors and type of recycled materials each will accept. Include names, addresses, and telephone numbers.
  - 4. Disposed Materials: Indicate how and where materials will be disposed of. Include name, address, and telephone number of each landfill and incinerator facility.
  - 5. Handling and Transportation Procedures: Include method that will be used for separating recyclable waste including sizes of containers, container labeling, and designated location where materials separation will be performed.
- D. Cost/Revenue Analysis: Indicate total cost of waste disposal as if there was no waste management plan and net additional cost or net savings resulting from implementing waste management plan. Use Form CWM-5 for construction waste. Include the following:
  - 1. Total quantity of waste.
  - 2. Estimated cost of disposal (cost per unit). Include hauling and tipping fees and cost of collection containers for each type of waste.
  - 3. Total cost of disposal (with no waste management).
  - 4. Revenue from salvaged materials.
  - 5. Revenue from recycled materials.
  - 6. Savings in hauling and tipping fees by donating materials.
  - 7. Savings in hauling and tipping fees that are avoided.
  - 8. Handling and transportation costs. Include cost of collection containers for each type of waste.
  - 9. Net additional cost or net savings from waste management plan.

## PART 2 - PRODUCTS (Not Used)

## PART 3 - EXECUTION

### 3.1 PLAN IMPLEMENTATION

- A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.
  - 1. Comply with operation, termination, and removal requirements in Section 01 50 00 "Temporary Facilities and Controls."

- B. Waste Management Coordinator: Engage a waste management coordinator to be responsible for implementing, monitoring, and reporting status of waste management work plan.
- C. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work.
  - 1. Distribute waste management plan to everyone concerned within three days of submittal return.
  - 2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.
- D. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
  - 1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.
  - 2. Comply with Section 01 50 00 "Temporary Facilities and Controls" for controlling dust and dirt, environmental protection, and noise control.

### 3.2 RECYCLING CONSTRUCTION WASTE, GENERAL

- A. General: Recycle paper and beverage containers used by on-site workers.
- B. Recycling Incentives: Revenues, savings, rebates, tax credits, and other incentives received for recycling waste materials shall be shared equally by Owner and Contractor.
- C. Preparation of Waste: Prepare and maintain recyclable waste materials according to recycling or reuse facility requirements. Maintain materials free of dirt, adhesives, solvents, petroleum contamination, and other substances deleterious to the recycling process.
- D. Procedures: Separate recyclable waste from other waste materials, trash, and debris. Separate recyclable waste by type at Project site to the maximum extent practical according to approved construction waste management plan.

### 3.3 RECYCLING CONSTRUCTION WASTE

- A. Packaging:
  - 1. Cardboard and Boxes: Break down packaging into flat sheets. Bundle and store in a dry location.
  - 2. Polystyrene Packaging: Separate and bag materials.
  - 3. Pallets: As much as possible, require deliveries using pallets to remove pallets from Project site. For pallets that remain on-site, break down pallets into component wood pieces and comply with requirements for recycling wood.
  - 4. Crates: Break down crates into component wood pieces and comply with requirements for recycling wood.
- B. Wood Materials:
  - 1. Clean Cut-Offs of Lumber: Grind or chip into small pieces.
  - 2. Clean Sawdust: Bag sawdust that does not contain painted or treated wood.
- C. Gypsum Board: Stack large clean pieces on wood pallets or in container and store in a dry location.
  - 1. Clean Gypsum Board: Grind scraps of clean gypsum board using small mobile chipper or hammer mill. Screen out paper after grinding.

3.4 DISPOSAL OF WASTE

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

END OF SECTION 01 74 19

SECTION 01 77 00

CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:

1. Inspection procedures.
2. Startup procedures
3. Warranties.
4. Final cleaning.

- B. Related Sections include the following:

1. Division 01 Section "Payment Procedures" for requirements for Applications for Payment for Substantial and Final Completion.
2. Division 01 Section "Execution Requirements" for progress cleaning of Project site.
3. Division 01 Section "Project Record Documents" for submitting Record Drawings, Record Specifications, and Record Product Data.
4. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
5. Division 01 Section "Demonstration and Training" for requirements for instructing Owner's personnel.
6. Divisions 02 through 49 Sections for specific closeout and special cleaning requirements for the Work in those Sections.

1.3 SUBSTANTIAL COMPLETION

- A. Preliminary Procedures: Before requesting inspection for determining date of Substantial Completion, complete the following. List items below that are incomplete in request.

1. Prepare a list of items to be completed and corrected (punch list), the value of items on the list, and reasons why the Work is not complete.
2. Advise Owner of pending insurance changeover requirements.
3. Submit specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.
4. Submit sustainable design submittals required in Section 01 81 13 "Sustainable Design Requirements - LEED for New Construction and Major Renovations."
5. Obtain and submit releases permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.
6. 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.
7. Deliver tools, spare parts, extra materials, and similar items to location designated by Owner. Label with manufacturer's name and model number where applicable.

8. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.
9. Complete startup testing of systems.
10. Submit test/adjust/balance records.
11. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.
12. Advise Owner of changeover in heat and other utilities.
13. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.
14. Complete final cleaning requirements, including touchup painting.
15. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

B. Inspection: Submit a written request for inspection for Substantial Completion. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor's list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. 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 STARTUP PROCEDURES

- A. The Preliminary Balance Report shall have been submitted by the Contractor to NAU prior to, and as a requirement of, Substantial Completion.
- B. The Final Balance Report shall have been submitted to the NAU prior to, and as a requirement of, Final Completion.
- C. Systems start-up, commissioning, and balancing shall be 100% complete prior to, and as a requirement of, Final Completion.

#### 1.5 FINAL COMPLETION

- A. Preliminary Procedures: Before requesting final inspection for determining date of Final Completion, complete the following:
  1. Submit a final Application for Payment according to Division 1 Section "Payment Procedures."
  2. Submit certified copy of Architect's Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. 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. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training videotapes.
- B. Inspection: Submit a written request for final inspection for acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.
  1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

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

- A. Preparation: Submit three copies of list. Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.
  - 1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor.
  - 2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.
  - 3. Include the following information at the top of each page:
    - a. Project name.
    - b. Date.
    - c. Name of Architect.
    - d. Name of Contractor.

## 1.7 WARRANTIES

- A. Submittal Time: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated.
- B. Partial Occupancy: Submit properly executed warranties within 15 days of completion of designated portions of the Work that are completed and occupied or used by Owner during construction period by separate agreement with Contractor.
- C. Organize warranty documents into an orderly sequence based on the table of contents of 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-11-inch paper.
  - 2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.
  - 3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.
- D. Provide additional copies of each warranty to include in operation and maintenance manuals.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

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

## PART 3 - EXECUTION

### 3.1 FINAL CLEANING

- A. General: Provide final cleaning. Conduct cleaning and waste-removal operations to comply with local laws and ordinances and Federal and local environmental and antipollution regulations.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to condition expected in an average commercial building cleaning and maintenance program. Comply with manufacturer's written instructions.

1. Complete the following cleaning operations before requesting inspection for certification of Substantial Completion for entire Project or for a portion of Project:

- a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.
- b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.
- c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.
- d. Remove tools, construction equipment, machinery, and surplus material from Project site.
- e. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.
- f. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.
- g. Sweep concrete floors broom clean in unoccupied spaces.
- h. Vacuum carpet and similar soft surfaces, removing debris and excess nap; shampoo if visible soil or stains remain.
- i. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.
- j. Remove labels that are not permanent.
- k. 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.
- l. Wipe surfaces of mechanical and electrical equipment, elevator equipment, and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.
- m. Replace parts subject to unusual operating conditions.
- n. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.
- o. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.
- p. Clean ducts, blowers, and coils if units were operated without filters during construction.
- 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.

C. NAU Cleaning Requirements: Provide final cleaning of the Work prior to NAU occupancy. Final cleaning shall mean cleaning each surface or unit of work to conditions expected in a first-class building and maintenance program. Comply with manufacturer's instructions for cleaning operations. Cleaning shall include, but not be limited to, the following as applicable:

1. Clean transparent/reflective surfaces to a polished, streak free condition including all mirrors, windows and door glass. Remove paint, putty, labels or other vision obscuring materials. Replace any broken or damaged surfaces.
2. Remove marks, stains, fingerprints, other soil and dirt from painted, decorated or stained work.

3. Clean polish woodwork as preferred by NAU.
  4. Clean light fixtures and lamps so as to function at full efficiency. Remove dirt, dust, fingerprints, excess lubrication, drywall, paint etc. and non- permanent labels.
  5. Wipe clean mechanical and electrical equipment; remove excess lubrication and other substances.
  6. Clean exposed interior and exterior surface finishes to condition free of dirt, dust, stains, films or other noticeable distracting substance.
  7. Clean exterior and interior metal surfaces, including doors and windows, of oil, stains, dust, dirt, paint and the like.
  8. Clean and polish hard floors, remove dirt, material or water stains, scratches etc.; clean and vacuum carpeted areas.
  9. Clean plumbing fixtures to polished, sanitary condition free of stains including those resulting from water.
  10. Except as otherwise indicated or requested by NAU, remove temporary protection devices and facilities which were installed during the course of the work.
- D. Make building ready for occupancy in all respects. Protect cleaned areas until final inspection and acceptance.
- E. Pest Control: Engage an experienced, licensed exterminator to make a final inspection and rid Project of rodents, insects, and other pests. Prepare a report.
- F. Comply with safety standards 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.

END OF SECTION 01 77 00

SECTION 01 78 23

OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:
  - 1. Operation manuals for systems, subsystems, and equipment.
  - 2. Maintenance manuals for the care and maintenance of products, materials, finishes, systems and equipment.
- B. Related Sections include the following:
  - 1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
  - 2. Division 01 Section "Closeout Procedures" for submitting operation and maintenance manuals.
  - 3. Division 01 Section "Project Record Documents" for preparing Record Drawings for operation and maintenance manuals.
  - 4. Divisions 02 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

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

1.4 SUBMITTALS

- A. Emergency Manuals: Types of emergencies, emergency instructions, and emergency procedures.
- B. Operation Manuals: System, subsystem, and equipment descriptions, operating procedures, wiring diagrams, control diagrams and sequence of operation, and piped system diagrams.
- C. Product Maintenance Manuals: Source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds.
- D. Systems and Equipment Maintenance Manuals: Source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranties and bonds.
- E. Initial Submittal: Submit 2 draft copies of each manual at least 15 days before requesting inspection for Substantial Completion. Include a complete operation and maintenance directory. Architect will return one copy of draft and mark whether general scope and content of manual are acceptable.

1. Format: PDF electronic files with composite electronic index on digital media acceptable to Architect. Include a complete electronically linked operation and maintenance directory.
  2. Hardcopy: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, one set(s) of copies
- F. Final Submittal: Submit one copy of each manual in final form at least 15 days before final inspection. Architect will return copy with comments within 15 days after final inspection.
1. Correct or modify each manual to comply with Architect's comments. Submit 3 copies of each corrected manual within 15 days of receipt of Architect's comments.

## 1.5 COORDINATION

- A. 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.

## PART 2 - PRODUCTS

### 2.1 MANUALS, GENERAL

- A. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
1. Title page.
  2. Table of contents.
  3. Manual contents.
- B. Title Page: Enclose title page in transparent plastic sleeve. Include the following information:
1. Subject matter included in manual.
  2. Name and address of Project.
  3. Name and address of Owner.
  4. Date of submittal.
  5. Name, address, and telephone number of Contractor.
  6. Name and address of Architect.
- C. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.
1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.
- D. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.
1. 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.
    - a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

- b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets.
2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.
3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software diskettes for computerized electronic equipment.
4. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
  - a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
  - b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

## 2.2 OPERATION MANUALS

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

## 2.3 PRODUCT MAINTENANCE MANUAL

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

## 2.4 SYSTEMS AND EQUIPMENT MAINTENANCE MANUAL

- A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.
- B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.
- C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
  - 1. Standard printed maintenance instructions and bulletins.
  - 2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
- D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
  - 1. Test and inspection instructions.
  - 2. Troubleshooting guide.
  - 3. Precautions against improper maintenance.

4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
  5. Aligning, adjusting, and checking instructions.
  6. Demonstration and training videotape, if available.
- E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.
1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
  2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.
- F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.
- G. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.
1. Include procedures to follow and required notifications for warranty claims.

## PART 3 - EXECUTION

### 3.1 MANUAL PREPARATION

- A. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.
- B. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.
1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
  2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.
- C. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.
1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.
- D. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in Record Drawings to ensure correct illustration of completed installation.
1. Do not use original Project Record Documents as part of operation and maintenance manuals.
  2. Comply with requirements of newly prepared Record Drawings in Division 01 Section "Project Record Documents."

END OF SECTION 01 78 23

SECTION 01 78 39

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:
  - 1. Record Drawings.
- B. Related Sections include the following:
  - 1. Division 01 Section "Summary of Multiple Contracts" for coordinating Project Record Documents covering the Work of multiple contracts.
  - 2. Division 01 Section "Closeout Procedures" for general closeout procedures.
  - 3. Division 01 Section "Operation and Maintenance Data" for operation and maintenance manual requirements.
  - 4. Divisions 02 through 33 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

- A. Record Drawings: Comply with the following:
  - 1. Number of Copies: Submit copies of Record Drawings as follows:
    - a. Initial Submittal: Submit one set of marked-up Record Prints. Architect will initial and date each and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return prints for organizing into sets, printing, binding, and final submittal.
    - b. Final Submittal: Submit one set of marked-up Record Prints. Print each Drawing, whether or not changes and additional information were recorded.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

- A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.
  - 1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

- a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
  - b. Accurately record information in an 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.
  - d. Locations and depths of underground utilities.
  - e. Revisions to routing of piping and conduits.
  - f. Revisions to electrical circuitry.
  - g. Actual equipment locations.
  - h. Duct size and routing.
  - i. Locations of concealed internal utilities.
  - j. Changes made by Change Order or Construction Change Directive.
  - k. Changes made following Architect's written orders.
  - l. Details not on the original Contract Drawings.
  - m. Field records for variable and concealed conditions.
  - n. Record information on the Work that is shown only schematically.
3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If 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 Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.
- B. Newly Prepared Record Drawings: Prepare new Drawings instead of preparing Record Drawings where Architect determines that neither the original Contract Drawings nor Shop Drawings are suitable to show actual installation.
1. New Drawings may be required when a Change Order is issued as a result of accepting an alternate, substitution, or other modification.
  2. Consult Architect 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.
- C. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.
1. Record Prints: Organize Record Prints and newly prepared Record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.
  2. Identification: As follows:
    - a. Project name.
    - b. Date.
    - c. Designation "PROJECT RECORD DRAWINGS."
    - d. Name of Architect.
    - e. Name of Contractor.

## 2.2 MISCELLANEOUS RECORD SUBMITTALS

- A. Assemble miscellaneous records required by other Specification Sections for miscellaneous record keeping and submittal in connection with actual performance of the Work. Bind or file miscellaneous records and identify each, ready for continued use and reference.

## PART 3 - EXECUTION

### 3.1 RECORDING AND MAINTENANCE

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

END OF SECTION 01 78 39

SECTION 01 79 00

DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:

- 1. Demonstration of operation of systems, subsystems, and equipment.
- 2. Training in operation and maintenance of systems, subsystems, and equipment.
- 3. Demonstration and training videotapes.

- B. Related Sections include the following:

- 1. Divisions 02 through 33 Sections for specific requirements for demonstration and training for products in those Sections.

1.3 SUBMITTALS

- A. Demonstration and Training Videotapes: Submit two copies within seven days of end of each training module.

- 1. Identification: On each copy, provide an applied label with the following information:

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

1.4 QUALITY ASSURANCE

- A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
- B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 1 Section "Quality Requirements," experienced in operation and maintenance procedures and training.
- C. Photographer Qualifications: A professional photographer who is experienced photographing construction projects.

## 1.5 COORDINATION

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

## PART 2 - PRODUCTS

### 2.1 INSTRUCTION PROGRAM

- A. Program Structure: Develop an instruction program that includes individual training modules for each system and equipment not part of a system, as required by individual Specification Sections, and as follows:
  - 1. Fire-protection systems, including fire alarm and fire-extinguishing systems.
  - 2. Conveying systems, including elevators.
  - 3. Refrigeration systems, including chillers, cooling towers, condensers, pumps, and distribution piping.
  - 4. HVAC systems, including air-handling equipment, air distribution systems, and terminal equipment and devices.
  - 5. HVAC instrumentation and controls.
  - 6. Electrical service and distribution, including transformers, switchboards, panelboards, and motor controls.
  - 7. Lighting equipment and controls.
  - 8. Communication systems.
- 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.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a combined training manual.
- B. Set up instructional equipment at instruction location.

### 3.2 INSTRUCTION

- A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
- B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
  - 1. Architect will furnish an instructor to describe basis of system design, operational requirements, criteria, and regulatory requirements.
  - 2. Owner will furnish an instructor to describe Owner's operational philosophy.
  - 3. Owner will furnish Contractor with names and positions of participants.
- C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
  - 1. Schedule training with Owner with at least seven days' advance notice.
- D. Cleanup: Collect used and leftover educational materials and remove from Project site. Remove instructional equipment. Restore systems and equipment to condition existing before initial training use.

### 3.3 DEMONSTRATION AND TRAINING VIDEOTAPES

- A. General: Engage a qualified commercial photographer to record demonstration and training videotapes. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
  - 1. At beginning of each training module, record each chart containing learning objective and lesson outline.
- B. Recording: Mount camera on tripod before starting recording, unless otherwise necessary to show area of demonstration and training. Display continuous running time.

END OF SECTION 01 79 00

## SECTION 01 81 13

### SUSTAINABLE DESIGN REQUIREMENTS

#### PART 1 GENERAL

##### 1.1 SUMMARY

- A. This Section includes general requirements and procedures for compliance with the U.S. Green Building Council's (USGBC) LEED Green Building Rating System™ to earn LEED Certification for this New Construction project at the Silver Level.
1. Achieving LEED Silver requires satisfying all pre-requisites and earning not less than 36 total points. Points are given by meeting the requirements for the selected credits. Credits are valued at one or more points as predetermined by USGBC.
  2. In order to insure the goal is met, the number of points targeted is greater than 36. A copy of the LEED Project Checklist listing the Prerequisites and targeted Credits is included in Section 01 81 13 – Sustainable Design Requirements.
- B. Related Sections
3. Section 00 30 00 – Available Information: Includes sample items from the Contractor' LEED Tool Kit
  4. Section 01 74 19 – Construction Waste Management.
  5. Section 01 91 13 – General Commissioning Requirements.
  6. Section 22 08 00 – Commissioning of Plumbing
  7. Section 23 08 00 – Commissioning of HVAC
  8. Section 26 08 00 – Commissioning of Electrical Systems
  9. Clarifications of LEED requirements specific to individual technical Sections are included in those Sections.

##### 1.2 REFERENCES

- A. LEED: Leadership in Energy & Environmental Design – A green building rating system designed by the USGBC. See [www.USGBC.org](http://www.USGBC.org).
- B. New Construction and Major Renovation, Version 4.0, Reference Guide (LEED Reference Guide): The guide published by the US Green Building Council, which details all requirements for achieving the LEED goals.
1. Requirements for the targeted goals are stated in the LEED Reference Guide and are hereby made part of the contract requirements. Retain at least one copy at the jobsite for reference by the project team. For convenience LEED requirements are summarized in this Section.
  2. LEED Reference Standards: Applicable standards are listed in the Reference Guide and also in the documents contained in the Contractor's Tool Kit.

##### 1.3 DEFINITIONS AND ABBREVIATIONS

- A. Regional Materials: Materials that are extracted, harvested or recovered and manufactured within a radius of 500 miles from the Project site.
- B. Rapidly Renewable Materials: Materials made from agricultural products that are typically harvested within a ten-year or shorter cycle. Rapidly renewable materials include but may not be limited to products made from bamboo, cotton, flax, jute, straw, sunflower seed hulls, vegetable oils, or wool.
- C. Recycled Content: The percentage, by weight, of recycled material (recovered from the solid waste stream) incorporated into a building material or product. Refer to the Reference Guide for calculating the recycled content of an assembly.

1. "Post-consumer" material is defined as waste material generated by households or by commercial, industrial and institutional facilities in their role as end users of the product, which can no longer be used for its intended purpose.
2. "Pre-consumer" (formerly "post-industrial") material is defined as material diverted from the waste stream during the manufacturing process. Excluded is reutilization of materials in a process generated in that process, such as re-melted scraps. Note that for the purposes of Credit MR4, only 50 percent of the weight of pre-consumer material contributes to the Credit.

D. LEED Category Abbreviations: LEED credits are organized into six categories as follows:

1. SS = Sustainable Sites
2. WE = Water Efficiency (No specific LEED credits assigned to Contractor)
3. MR = Materials & Resources
4. EQ = Indoor Environmental Quality
5. ID = Innovation & Design Process

#### 1.4 SUBMITTALS

A. LEED submittals: Collect and organize documentation for scheduled reviews by the Architect's LEED Consultant. Prepare final documentation and upload directly online. The paragraphs below describe requirements for submittals pertaining exclusively to LEED:

1. Material Data
2. Action Plans
3. Progress Reports
4. LEED Online Submittals

B. LEED submittals for specific materials or systems are also mentioned in the technical Sections of the Specifications, particularly for products and materials expected to contribute to certain MR credits.

C. A "Contractor's Tool Kit" is available from the Architect's LEED Consultant, which contains the following tools for collecting and managing the required information.

1. General Contractor's Guidelines
2. Subcontractor's LEED Worksheets Tables for MRc4, MRc5, and MRc6,
3. Subcontractor's LEED Worksheets Tables for EQc4 – Low Emitting Materials
4. Construction Waste Management Plan Template
5. Construction Indoor Air Quality Management Plan Template

D. Material Costs: Cost of building materials incorporated into the Project regardless of whether they contribute to LEED goals. Do not include mechanical, electrical and plumbing components and specialty items such as elevators and equipment. The Subcontractor's LEED Worksheet Transmittal Form provided in the Tool Kit is to assist in collecting cost data (in addition to other information).

E. Other Product Data: Collect one product data sheet for each product, for each pertinent Credit. Assemble Product data by CSI numbers and tally Worksheet data in tables for periodic review by Architect's LEED Consultant. Indicate relevant data with circles, arrows, or underlines. Provide the following:

1. Credit MR 4 - Recycled Materials: Product data indicating pre-consumer and post consumer recycled content. Organize collected product cut sheets by CSI Section numbers for periodic review by LEED Consultant. Subcontractor's LEED Worksheet Table for MRc4 is available to facilitate data collection.
2. Credit MR5 – Regional Materials: Distance between project site and location of harvest (as well as distance between project site and location of manufacturer only for products that qualify as Regional Materials). Subcontractor's LEED Worksheet Table for MRc5 is available to facilitate data collection.
3. Credit MRc6 – Rapidly Renewable Materials
4. Credit MRc7 – Certified Wood: Product data indicating chain of custody (COC) letter number for products certified by the Forest Stewardship Council (FSC).
5. Credit EQ 3.2: Product data for filtration used during flush-out (if flush out option is chosen) and immediately prior to occupancy. Data must indicate MERV rating of at least 13.

6. Credit EQ 4: Product Data for adhesives and sealants used on the interior of the building indicating the actual and allowable VOC content of each product in g/L. Subcontractor's LEED Worksheet Table for EQc4.1 is available to facilitate data collection.
  7. Credit EQ 4.2: Product Data for paints and coatings used on the interior of the building indicating the actual and allowable VOC content of each in g/L. Subcontractor's LEED Worksheet Table for EQc4.2 is available to facilitate data collection.
  8. Credit EQ4.3: Product Data for carpet products showing compliance with the Carpet and Rug Institute's Green Label Plus Program. Subcontractor's LEED Worksheet Table for EQc4.3 is available to facilitate data collection.
  9. Credit EQ4.4: Product Data for composite wood and agrifiber products used in the building interior including plywood, cabinet materials, and wood doors, etc., indicating that products contain no urea-formaldehyde resin. Subcontractor's LEED Worksheet Table for EQc4.2 is available to facilitate data collection. Verify whether EQc4.4 is being pursued.
- F. LEED Action Plans: Provide submittals within the number of days indicated below after start of the Work demonstrating the following:
1. Credit MR 2 – Construction Waste Management (CWM): Within 30 days submit CWM Plan complying Division 01 Section "Construction Waste Management."
  2. Credit MR4 – Recycled Content: Within 60 days submit list of materials expected to have recycled content.
  3. Credit MR5 – Regional Materials: Within 60 days submit list of expected regional materials.
  4. Credit MR6 – Rapidly Renewable Materials: Within 60 days submit list of expected rapidly renewable materials.
  5. Credit EQ31 - Construction Indoor Air Quality Management Plan (CIAQMP), During Construction: Prior to ordering of HVAC components submit completed CIAQMP using template furnished by Architect's LEED Consultant.
  6. Credit EQ 3.2 - Construction IAQ Plan, Before Occupancy: Within 30 days after start of the Work determine which of the two options listed below will be pursued, and show the appropriate task incorporated into the project schedule. 30 days prior to start of flush-out or testing provide the following information for the chosen option:
    - a. Option 1: Building flush-out per the LEED-NC v2.2 Reference Guide: Add needed information to complete the "Construction IAQ Management Plan template.
    - b. Option 2: Air quality testing using testing protocols detailed in the LEED Reference Guide. Provide dates of proposed testing, methodology, company name, and number and area of proposed tests.
- G. LEED Progress Reports: Within 30 days following the start of Work meet with the Architect's LEED Consultant to discuss the frequency and format of progress reporting for the following:
1. Prerequisite SSp1 – Construction Activity Pollution Protection: Brief narrative of erosion control measures implemented in accordance with Storm Water Pollution Prevention Plan.
  2. Credit MR2 – Construction Waste Management: Waste diversion progress reports complying with Division 1 Section.
  3. Credit MR4 - Recycled content, Credit MR5 – Regional Materials, and Credit MR6 – Rapidly Renewable Materials: Spreadsheets compiling actual construction and purchasing activities for assessment with LEED goals. LEED Consultant will furnish a spreadsheet tool that may be used to assist with managing these Credits.
  4. Credit EQ4 – Low Emitting Materials – Tables listing product data required for satisfying all credit requirements. LEED Consultant will furnish a spreadsheet tool designed to assist with managing these Credits.
- H. LEED-Online Submittals: The Contractor will receive instructions from the Architect's LEED Consultant for accessing the project online at the USGBC's LEED On-line Website. The LEED Consultant will assign responsibility to the Contractor for completing Online templates for the Prerequisite and Credits listed below. Refer to and use the On-Line Templates for the form and content of documentation required for each item. At project completion upload the following information:
1. Credit SSp1 – Construction Activity Pollution Protection: Brief narrative of erosion control measures actually implemented and in accordance with the SWPPP.
  2. Credit MR 2 - Recycled Content: Complete the LEED On-Line Template demonstrating compliance with Division 1 Section "Construction Waste Management."

3. Credit MR 4 - Recycled Materials: Complete On-Line LEED Template, indicating costs for each product having recycled content plus the recycled content and indicate the information source.
4. Credit MR5 – Regional Materials: Complete On-Line LEED Template, indicating costs for each regional product. Indicate distance between project site and location of harvest as well as distance between project site and location of manufacturer for each Regional product.
5. Credit MRc6 - Rapidly Renewable Materials: Complete On-Line LEED Template, indicating costs for each Rapidly Renewable material, the pertinent percentages and the information source.
6. Credit MR7 – Certified Wood: Complete On-Line LEED Template, indicating costs for each wood product. For certified wood include the COC letter number.
7. Credit EQ3.1: Complete LEED On-Line Template and upload:
  - a. Construction Indoor Air Quality Management Plan.
  - b. Construction Documentation; Photographs taken at different phases of construction; equipment delivery, equipment installation and protection, building enclosure and filtration replacement and maintenance, 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.
8. Credit EQ 3.2: Complete the LEED On-Line Template including:
  - a. Description of 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. Include calculations that the equipment used for flush-out provided the required volume of air required for flush-out over the time period indicated.
 

**OR (Contractor's Option)**
  - b. Report from testing and inspecting agency indicating results of IAQ testing and documentation showing conformance with IAQ testing procedures and requirements.
9. Credit EQ 4.1, 4.2, 4.3, & 4.4: Complete the summary tables by transferring product data collected on Worksheets to the template.

## PART 2 PRODUCTS

### 2.1 PRODUCTS CONTRIBUTING TO PERCENTAGE GOALS

- A. Achieving the targeted LEED Credits having to do with the cumulative contribution of material selection depends on both the Architect and Contractor. Many products are intentionally specified for their contribution to the percentage goals. In cases where there is leeway for selection by the Contractor, strategic purchasing must be implemented to complete the goals.
- B. Credit MR4 – Recycled Content: Provide building materials such that a minimum of ten percent of all Project materials by cost are “recycled” as defined above.
- C. Credit MR5 – Regional Materials: Provide materials such that ten percent of all Project materials by cost are “regional” by definition.
- D. Credit MR6.0 – Rapidly Renewable Materials: Provide materials such that 2.5 percent of all Project materials by cost are “rapidly renewable” by definition.
- E. Credit MR7.0 – Certified Wood: Provide building materials such that a minimum of 50 percent of the cost of new wood used for the Project is certified as defined above. See the LEED Reference Manual for details regarding what is classified as new wood.

### 2.2 LOW-EMITTING MATERIALS

- A. For Credits EQ4.1 through EQ4.4 the adhesives, sealants, paints, carpets and composite woods are specified to comply with the credit requirements. Ensure that unspecified, generic “truck stock” items also comply.

PART 3 EXECUTION

3.1 EXECUTION OF LEED PLANS

- A. Credit MR 2 – Construction Waste Management (CWM): Divert waste from landfill and incineration facilities to achieve diversion rate specified in Division 1 Section –Construction Waste Management.

END OF SECTION 01 81 13

## SECTION 01 91 13

### GENERAL COMMISSIONING REQUIREMENTS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. This section includes general requirements that apply to implementation of commissioning. The commissioned systems for this project are as follows:
  - 1. HVAC equipment listed in the mechanical schedule.
  - 2. HVAC Controls including the Building Automation System (DDC) and Local Controls on HVAC equipment
  - 3. Plumbing: domestic hot water systems.
  - 4. Lighting & Day Lighting Controls
  - 5. Renewable energy systems
- B. RELATED SECTIONS:
  - 1. Division 22 Section: Plumbing - plumbing systems, assemblies, equipment, and components.
  - 2. Division 23 Section: Heating, Ventilating & Air Conditioning - HVAC&R systems, assemblies, equipment, and components.
  - 3. Division 23 Section: Testing, Adjusting, Balancing for HVAC
  - 4. Division 23 Section: Building Automation System for HVAC - integrated building automation systems, assemblies, equipment, and components.
  - 5. Division 26 Section: Instrumentation & Control for Electrical- lighting control systems, assemblies, equipment, and components.
- C. Commissioning is a comprehensive and systematic process to verify that the building systems perform as designed to meet the owner's requirements. Commissioning during the design, construction, acceptance, and warranty phases is intended to achieve the following specific objectives:
  - 1. Verify and document that equipment is installed and started per manufacturer's recommendations and to industry accepted standards.
  - 2. Verify and document that equipment and systems receive complete operational checkout by installing contractors.
  - 3. Verify and document equipment and system performance.
  - 4. Verify the completeness of operations and maintenance materials.
  - 5. Ensure that the owner's operating personnel are adequately trained on the operation and maintenance of building equipment.
- D. Complete the requirements to meet the LEED pre-requisite for Fundamental Commissioning of Building Energy Systems and the LEED credit for Enhanced Commissioning.

- E. 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.

### 1.3 DEFINITIONS

- A. A/E – Architect and Engineer on the design team.
- B. BOD - Basis of Design. A document 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.
- C. Cx Plan - Commissioning Plan. A document that outlines the organization, schedule, allocation of resources, and documentation requirements of the commissioning process.
- D. CxA - Commissioning Authority.
- E. EOR – Engineer of Record.
- F. FPT – Functional Performance Test. FPTs can be multi-discipline and multi-trade activities that require choreographing and rehearsing with the project team.
- G. HVAC&R - Heating, Ventilating, Air Conditioning, and Refrigeration.
- H. Systems, Subsystems, Equipment, and Components: Where these terms are used together or separately, they shall mean "as-built" systems, subsystems, equipment, and components.
- I. OPR - Owner's Project Requirements. A document that details the functional requirements of a project and the expectations of how it will be used and operated. These include Project goals, measurable performance criteria, cost considerations, benchmarks, success criteria, and supporting information.
- J. PFC - Pre-Functional Checklist. The PFC documents the construction status of the equipment or system and ensures that pre-requisite systems and checks are completed prior to energizing and operating the equipment. Upon completion of the PFC, the equipment and / or systems are complete and operational, so that the functional performance testing can be scheduled. The PFC may require that a start-up certification from the vendor, control points lists, and sequence verification forms are attached.

### 1.4 COMMISSIONING TEAM

- A. At a minimum, the members of the commissioning team consist of the Commissioning Agent (CxA), the Owner's Representative (PM), the General Contractor (GC or Contractor), the architect and design engineers (A/E), the Mechanical Contractor (MC), the Electrical Contractor (EC), the Controls Contractor (CC), the Test and Balance Contractor (TAB), the owner's maintenance staff, and any other installing subcontractors or suppliers of equipment.
- B. Members Appointed by Contractor(s): Individuals, each having the authority to act on behalf of the entity he or she represents, explicitly organized to implement the commissioning process through coordinated action. The commissioning team shall consist of, but not be limited to, representatives of each Contractor, including Project superintendent and subcontractors, installers, suppliers, and specialists deemed appropriate by the CxA.

- C. All applicable sub-contractors shall include cost for their involvement in the commissioning process including demonstration of installed equipment to the commissioning team members during the acceptance portion of the project, and other responsibilities as described in the specification.
- D. Members Appointed by Owner:
  - 1. CxA: The designated person, company, or entity that plans, schedules, and coordinates the commissioning team to implement the commissioning process.
  - 2. Representatives of the facility user and operation and maintenance personnel.
  - 3. Architect and engineering design professionals.

## 1.5 COMMISSIONING PROCESS

- A. The following activities describe the commissioning tasks during construction and the general order in which they occur. The commissioning provider coordinates all activities.
  - 1. Kick-Off Meeting. Appropriate members of the design and construction team that will be involved in the commissioning process will attend a commissioning scoping meeting to be introduced to the requirements of the commissioning: checklists, tests, scope of work, schedule, tasks, and contractor responsibilities with regard to the implementation of the Commissioning Plan.
  - 2. Commissioning Plan. The commissioning plan provides guidance in the execution of the commissioning process.
  - 3. Submittals. Equipment submittals are to be submitted by the contractor to the CxA and concurrently to the EOR for review and approval for the all equipment and systems to be commissioned (refer to section 1.2.A).
  - 4. Start-Up/Pre-Functional Checklists. The CxA works with the contractors to develop startup plans and verification of readiness for commissioning documentation format. Pre-functional checklists will be provided to the contractors to be completed during the startup process, or pre-functional checklists may be provided by the contractor with prior review and approval by the CxA. Completion of the Pre-functional checklists indicates readiness for functional testing. If the CxA is notified by the installing contractor that the systems is ready for testing, and the CxA is unable to test because of the state of system readiness, the installing subcontractor will be back charged for the CxA's time and expense at the current year's labor rate for the CxA.
  - 5. Functional Performance Testing. The objective of functional performance testing is to demonstrate that each system is operating according to the documented OPR, BOD and Construction Documents. Functional performance testing comprises a full range of tests to verify that all components, equipment, systems, and interfaces between systems operate correctly. This includes all operating modes, interlocks, control sequences, and responses to emergency conditions. All verification procedures are directed, witnessed, and documented by the CxA. Any testing or manipulation of electrical power, interlocks, alarms or system controls will be by the installing contractor.
  - 6. Deficiencies and Resolution. The CxA documents items of non-compliance in materials, installation or operation. In collaboration with the entity responsible for system and equipment installation, perform corrective action until the issues are resolved to the satisfaction of the owner or the CxA. When the deficiencies are rectified, the contractor will notify the CxA for final re-testing. Any subsequent re-testing due to un-resolved deficiencies will be back charged to the contractor for the CxA's time and expense at the current year's labor rate for the CxA.
  - 7. Operations and Maintenance Documentation. The CxA reviews the O&M documentation for completeness.
  - 8. Training. The CxA reviews the training provided by the contractors and verifies that it is completed.
  - 9. Seasonal Testing. Deferred or seasonal testing is conducted, as required. Contractors will be responsible for the demonstration of the tests.

## 1.6 SUBMITTALS

- A. The CxA will require submittals for all commissioned equipment to formulate the pre-functional tests and functional tests. Additionally, the CxA reviews submittals related to the commissioned equipment and their controls for conformance to the OPR, BOD and Construction Documents. Equipment submittals are to be submitted by the contractor to the CxA and concurrently to the EOR for review and approval for the all equipment and systems to be commissioned (refer to section 1.2.A).
- B. The CxA may submit written requests for additional information from contractors to facilitate the commissioning process.
- C. The CxA may request additional design and operations narrative from the design team and Controls Contractor.

## 1.7 REPORTING

- A. The CxA will provide regular reports to the Owner and the GC with increasing frequency as construction and the process of commissioning progresses.
- B. The CxA will regularly communicate with all members of the commissioning team, apprising them of commissioning progress and scheduling changes through memos, progress reports, etc.
- C. The CxA compiles a final Commissioning Report which summarizes all of the tasks, findings, and documentation of the commissioning process. The report addresses the actual performance of the building systems in reference to the design intent and contract documents. The report includes completed pre-functional inspection checklists, functional performance testing records, diagnostic monitoring results, identified deficiencies, recommendations, and a summary of commissioning activities.

## 1.8 MEETINGS

- A. Scoping Meeting. The CxA will schedule, plan and conduct a commissioning scoping meeting with the entire commissioning team in attendance. The CxA will distribute meeting minutes to all parties.
- B. Miscellaneous Meetings. Other meetings will be planned and conducted by the CxA as construction progresses as appropriate. These meetings will cover coordination, deficiency resolution and planning issues. The attendance of a representative of each subcontractor on the commissioning team will be required.

## PART 2 - RESPONSIBILITIES

2.1 The responsibilities of various parties in the commissioning process are provided in the following sections. Note that the services for the Owner, Design Team, and Commissioning Provider are not included in this contract. The Contractor is not responsible for providing their services. Their responsibilities are listed here to clarify the commissioning process only.

### 2.2 OWNER'S RESPONSIBILITIES

- A. Provide the OPR documentation to the CxA and each Contractor for information and use.

- B. Assign operation and maintenance personnel and schedule them to participate in commissioning team activities.
- C. Provide the OPR prepared by the Owner and provide the BOD documentation, prepared by Design Engineers/Architect and approved by Owner, to the CxA and each Contractor for use in developing the commissioning plan, systems manual, and operation and maintenance training plan.

### 2.3 ARCHITECT & ENGINEER(S) OF RECORD'S RESPONSIBILITIES(A/E)

- A. Construction and Acceptance Phase
  - 1. Attend the commissioning kick-off meeting and selected commissioning team meetings.
  - 2. Perform normal submittal review, construction observation, as-built drawing preparation, O&M manual preparation, etc., as contracted and provide a copy to the CxA.
  - 3. Provide design narrative documentation requested by the CxA.
  - 4. Coordinate resolution of system deficiencies identified during commissioning, according to the contract documents.
  - 5. Resolve issues identified by the CxA that are related to errors in design.
  - 6. Prepare and submit final as-built BOD documentation for inclusion in the O&M manuals. Review and approve the O&M manuals.
- B. Warranty Period
  - 1. Coordinate resolution of design non-conformance and design deficiencies identified during warranty period commissioning.

### 2.4 GENERAL CONTRACTOR (GC)

- A. Construction and Acceptance Phase
  - 1. Facilitate the coordination of the commissioning work by the CxA.
  - 2. Integrate all commissioning activities into the master construction schedule. The schedule will include the following information for each piece of equipment: Factory acceptance tests, pre-functional testing, equipment functional testing, system performance testing and site integration testing.
  - 3. A representative shall attend a commissioning kick-off meeting and other necessary meetings scheduled by the CxA to facilitate the commissioning process.
  - 4. Furnish a copy of all construction documents, addenda, change orders and approved submittals and shop drawings related to commissioned equipment and systems to the CxA.
  - 5. In each purchase order or subcontract written, include requirements for submittal data, O&M data, commissioning tasks and training.
  - 6. Ensure that all subcontractors execute their commissioning responsibilities according to this specification and the commissioning plan.
  - 7. Ensure that equipment vendors (or their local representative) that are required to perform on site start-up will attend functional testing. GC is to include this clause in specified vendor's RFP.
  - 8. Coordinate the sub-contractors and equipment vendors for required Pre-Functional and Functional Performance testing including testing that requires multi-discipline and multi-trade activities.
  - 9. Ensure that Subcontractors correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings per the issues identified by the CxA.
  - 10. Coordinate the training of owner personnel.
  - 11. Prepare O&M manuals, as-builts (including clarifying and updating the original sequences of operation to as-built conditions), warranties, spare parts, submittals and submittal logs, RFI's and RFI logs, etc according to the format developed by the CxA , in coordination with the Engineer, and reviewed and approved by the Owner. The documents shall be submitted by the Contractor to the Commissioning Authority both electronically and in hard copy. All electronic PDF documents shall be searchable with bookmarks mimicking the tabs in the binder.
- B. Warranty Period

1. Ensure that subcontractors execute required seasonal or deferred functional performance testing.
2. Ensure that subcontractors correct deficiencies and make necessary adjustments to O&M manuals and as-built drawings for issues identified in seasonal testing.

2.5 INSTALLING CONTRACTORS RESPONSIBILITIES: (Mechanical Contractor (MC), Plumbing Contractor (PC), Electrical Contractor (EC), Controls Contractor (CC), Fire Protection Contractor (FPC))

- A. The responsibilities of Contractors in the commissioning process are provided in this section to clarify the commissioning process.
- B. Contractors shall assign representatives with expertise and authority to act on its behalf and shall schedule them to participate in and perform commissioning process activities including, but not limited to, the following:
  1. The CxA will work with the GC to schedule commissioning activities. The GC shall integrate all commissioning activities into the master construction schedule. All parties will address scheduling issues in a timely manner in order to expedite the commissioning process.
  2. Equipment submittals are to be submitted by the contractor to the CxA and concurrently to the EOR for review and approval for the all equipment and systems to be commissioned (refer to section 1.2.A).
  3. Attend Commissioning and Coordination Meetings during the construction, acceptance and warranty phases as designated by the CxA.
  4. Attend construction phase controls coordination meeting.
  5. Integrate and coordinate commissioning process activities into the construction schedule.
  6. Document equipment installation, testing, and startup activities as defined by the manufacturer and provide to the CxA as supporting documents attached to the Pre-Functional Checklists.
  7. Labor, instrumentation, tools, and test equipment costs for technicians for the performance of commissioning pre-functional equipment checks and functional performance testing are to be provided by the contractor responsible for the installation of the equipment or system to be commissioned. Tools and test equipment are to be calibrated and in good working order. Testing equipment calibration certifications must be current in accordance with all requirements of the Project Manual.
  8. Provide measuring instruments and logging devices to record test data, and provide data acquisition equipment to record data for the complete range of testing for the required test period as designated by the CxA.
  9. Perform the pre-functional equipment checks and document these requirements and tests in the pre-functional checklists provided by the CxA. Contractor is to deliver the pre-functional checklists completed and signed to the CxA, along with supporting documentation for all commissioned equipment and systems one (1) week prior to Functional Performance Testing. All completed pre-functional checklists must be approved by the Commissioning Agent before functional performance testing is started. If the contractor indicates inaccurate completion of these checklists, and it results in the CxA unable to perform the Functional Performance Tests, the contractor will be back charged for the CxA's time and expense at the current year's labor rate for the CxA.
  10. Review the commissioning process functional test procedures (Functional Performance Tests – FPTs ) provided by the Commissioning Authority. Testing will include all operation and alarm modes.
  11. At least one (1) week prior to functional performance testing the Contractors will provide written verification that all electrical connections are complete, dust making activities have ceased, all control's point to point verification is completed, all commissioned systems and equipment start-ups are completed, Pre-Functional Checklists and Pre-Functional Verification Forms Completed and signed, all equipment to be commissioned is in operation, the Building Automation System's Graphics and Trending are Complete, TAB is completed, Lighting and Fire Protection Controls and Sensors are completed and O&M Manuals are available.
  12. Address current A/E punch list items before functional testing.
  13. The HVAC contractor will provide a preliminary TAB report to the CxA one (1) week prior to testing.

14. The Contractor(s) will demonstrate and perform commissioning process functional performance tests under the direction of the CxA and with the CxA acting as a witness to the tests. If the functional performance tests result in deficiencies, the contractor will be given an Issues Log listing the deficiencies discovered during testing. When the deficiencies are rectified, the contractor will notify the CxA for final re-testing. Any subsequent re-testing due to un-resolved deficiencies will be back charged to the contractor for the CxA's time and expense at the current year's labor rate for the CxA.
  15. Cooperate with the CxA for resolution of issues recorded in the Issues Log, Construction Observation and test reports. In collaboration with the entity responsible for system and equipment installation, perform corrective action until the issues are resolved to the satisfaction of the owner or the CxA.
  16. Participate in systems, assemblies, equipment, and component maintenance orientation and inspection as called out in the installation specifications.
  17. Provide the CxA with training curricula for review and approval for all commissioned equipment and systems a minimum of four weeks prior to the scheduled training. Provide a record of attendance for Owner's Operation and Maintenance Training on required commissioned systems.
  18. Provide EOR and CxA with site specific copies of Operation and Maintenance Manuals detailing all manufacturer's recommended maintenance procedures and spare parts lists for review and approval for all commissioned equipment and systems a minimum of four weeks prior to submission for substantial completion.
  19. Provide "As Built" drawings for all commissioned equipment and systems to the EOR and the CxA for review and approval.
- C. If the installing contractor requires the vendor to perform start-up, then the factory start-up technician or qualified local representative will be required to attend functional testing.

## 2.6 ADDITIONAL RESPONSIBILITIES FOR CONTROLS CONTRACTOR (CC), LIGHTING CONTROLS (EC) AND FIRE PROTECTION CONTRACTOR (FPC)

- A. Upon completion of the installation, Contractor will provide evidence (pre-functional checklists with acceptance signatures) to the Commissioning Agent that all:
  1. Analog input points have been tested and calibrated.
  2. Digital input points have been tested.
  3. Analog output points stroke / function properly.
  4. Digital output points operate properly.
- B. Work with the Commissioning Agent to develop tuning validation tests using appropriate trend logs to show that control loops have been properly tuned to optimize energy usage while maintaining stable operation and occupant comfort.
- C. Commissioning Tools Graphic shall be created for each unique System for Global override of positions or set points to assist in commissioning. Graphic shall be accessible from each System or Unitary Graphic. A commissioning graphic for the chilled water system would allow all of the cooling control valves to be opened or closed. A graphic would provide temperature override to all zones in the building, similar graphics will be created for all other systems. This graphic should also display individual zone values including maximums and minimums – e.g. for fan coil unit graphic, this includes fan status, fan command, heating water valve command, chilled water valve command, supply air temperature, filter status, etc.

## 2.7 ADDITIONAL RESPONSIBILITIES FOR MECHANICAL / PLUMBING CONTRACTOR (MC)

- A. The Contractor(s) will demonstrate and perform hydrostatic test and flush requirements including HVAC piping pressure testing under the direction of the CxA and with the CxA acting as a witness to the tests. If the tests result in deficiencies, the contractor will be given an Issues Log listing the deficiencies discovered during testing. When the deficiencies are rectified, the contractor will notify

the CxA for final re-testing. Any subsequent re-testing due to un-resolved deficiencies will be back charged to the contractor for the CxA's time and expense at the current year's labor rate for the CxA.

## 2.8 ADDITIONAL RESPONSIBILITIES FOR ELECTRICAL CONTRACTOR (EC)

- A. The Contractor(s) will demonstrate and perform electrical insulation resistance testing under the direction of the CxA and with the CxA acting as a witness to the tests. If the tests result in deficiencies, the contractor will be given an Issues Log listing the deficiencies discovered during testing. When the deficiencies are rectified, the contractor will notify the CxA for final re-testing. Any subsequent re-testing due to un-resolved deficiencies will be back charged to the contractor for the CxA's time and expense at the current year's labor rate for the CxA.

## 2.9 TESTING, ADJUSTING, AND BALANCING (TAB) CONTRACTOR RESPONSIBILITIES

- A. Construction and Acceptance Phases
  1. Attend a commissioning kick-off meeting and other necessary meetings scheduled by the CxA to facilitate the commissioning process.
  2. Contractors shall coordinate equipment names with CxA commissioned equipment and systems when unique names of the equipment have not been assigned by the EOR.
  3. Provide the CxA with a list of deficiencies discovered during the TAB process before functional performance testing.
  4. Provide the CxA with a preliminary TAB report at least 1 week prior to functional performance testing for review and approval.
  5. After the TAB process is performed and the balance report is submitted, the CxA shall perform a verification test. The extent of verification shall be to the discretion of the commissioning agent; however a minimum of 15% of all readings shall be verified. If readings deviate more than + or - 10% from the report the TAB contractor shall be directed to re-balance the system and submit new reports.
  6. Correct deficiencies (differences between specified and observed performance) as interpreted by the CxA, PM and A/E and retest the equipment. Make necessary adjustments to the TAB report and provide the CxA with a final copy of the TAB report.

## 2.10 EQUIPMENT SUPPLIERS

- A. Provide all requested submittal data, including detailed start-up procedures and specific responsibilities of the Owner to keep warranties in force.
- B. If the installing subcontractor requires the vendor to perform start-up, then the factory start-up technician or qualified local representative will be required to attend functional testing and assist in equipment testing after start-up.
- C. Provide information requested by CxA regarding equipment sequence of operation and testing procedures.

## 2.11 CxA RESPONSIBILITIES

- A. The primary role of the CxA is to develop and coordinate the execution of a Cx plan, observe construction and testing. The CxA will document that the performance of the commissioned systems are functioning in accordance with the documented OPR, BOD and the Contract Documents. 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 and the A/E team.

- B. Coordinates and directs all commissioning activities. Work with the GC and PM to ensure that commissioning activities are being scheduled.
- C. Plan and conduct the commissioning kick-off meeting.
- D. Review Contractor submittals applicable to commissioned systems, concurrent with the EOR reviews.
- E. Provide and revise as necessary, the commissioning plan (Cx Plan).
- F. Request and review additional information required to perform commissioning tasks, including O&M materials, contractor start-up and checkout procedures, and sequences of operation.
- G. Perform site visits, as contracted, to observe component and system installations. Attend selected planning and job-site meetings to obtain information on construction progress.
- H. The CxA develops project-specific construction checklists (pre-functional checklists), commissioning process test procedures (Functional Performance Tests – FPTs, for the equipment and systems to be commissioned. These procedures are based on the construction documents prepared by the design team as well as the OPR and BOD. The tests include step by step descriptions of each activity in chronological order including duration, required personnel, and back out procedure for each step. Test scripts shall also include any requirements for supplemental monitoring equipment and radio communications during the tests. FPTs, are multi-discipline and multi-trade activities that may require choreographing and rehearsing with the contractors and Cx Team members. All verification procedures are directed, witnessed, and documented by the CxA, with other parties present as appropriate.
- I. Coordinate, witness, and document functional performance tests performed by installing contractors. Coordinate a final re-testing to determine whether a satisfactory performance is achieved.
- J. Prepare and maintain the Issues Log.
- K. Review and witness systems, assemblies, equipment, and component startup.
- L. Compile test data, inspection reports, and certificates; include them in the systems manual and final commissioning report.
- M. Review the Operation and Maintenance Manuals.
- N. Review Owner Operation and Maintenance training curricula and document owner training has taken place as required.

END OF SECTION 01 91 13

SECTION 02 41 19

SELECTIVE DEMOLITION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section requires the selective removal and subsequent offsite disposal of the following:
  - 1. Portions of existing building indicated on drawings and as required to accommodate new construction.
  - 2. Removal and protection of existing items indicated "salvage."
- B. Removal work specified elsewhere:
  - 1. Cutting nonstructural floors and walls for piping, ducts, and conduits is included with the work of the respective mechanical and electrical specification sections in Divisions 21, 22, 23, 25, 26, and 27.
- C. Remodeling construction work and patching are included within the respective sections of specifications, including removal of materials for reuse and incorporation into remodeling or new construction.
- D. Relocation of pipes, conduits, ducts, and other mechanical and electrical work is specified in other Divisions.

1.3 DEFINITIONS

- A. Remove: Detach items from existing construction and legally dispose of them off-site unless indicated to be removed and salvaged or removed and reinstalled.
- B. Remove and Salvage: Carefully detach from existing construction, in a manner to prevent damage, and deliver to Owner ready for reuse.
- C. Remove and Reinstall: Detach items from existing construction, prepare for reuse, and reinstall where indicated.
- D. Existing to Remain: Existing items of construction that are not to be permanently removed and that are not otherwise indicated to be removed, removed and salvaged, or removed and reinstalled.

1.4 SUBMITTALS

- A. Schedule indicating proposed sequence of operations for selective demolition work to Architect (for Owner's Representative review prior to start of work). Include coordination for shutoff, capping, and continuation of utility services as required, together with details for dust and noise control protection.
  - 1. Provide detailed sequence of demolition and removal work to ensure uninterrupted progress of Owner on-site operations.

2. Coordinate with Owner continuing occupation of portions of the building.
- B. Photograph or video existing conditions of structure surfaces, equipment, and adjacent improvements that might be misconstrued as damage related to selective demolition operations. File with Architect prior to start of work.
1. If no photographs or videos are submitted, damage will be assumed to be Contractor's responsibility.

#### 1.5 PROJECT CONDITIONS

- A. Occupancy: Owner will occupy portions of the building immediately adjacent to areas of selective demolition. Conduct selective demolition work in manner that will minimize need for disruption of normal operations of Owner. Provide minimum of 72 hours advance notice to Owner of demolition activities that will affect normal operations of Owner.
- B. Condition of Structures: Owner assumes no responsibility for actual condition of items or structures to be demolished.
1. Conditions existing at time of inspection for bidding purposes will be maintained by Owner insofar as practicable. However, minor variations within structure may occur by Owner's removal and salvage operations prior to start of selective demolition work.
- C. Partial Demolition and Removal: Items indicated to be removed but of salvageable value to Contractor may be removed from structure as work progresses. Transport salvaged items from site as they are removed.
1. Storage or sale of removed items on site will not be permitted.
- D. Protections: Provide temporary barricades and other forms of protection to protect Owner personnel and general public from injury due to selective demolition work.
1. Provide protective measures as required to provide free and safe passage of Owner's personnel and general public to occupied portions of building.
  2. Erect temporary covered passageways as required by authorities having jurisdiction.
  3. Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of structure or element to be demolished and adjacent facilities or work to remain.
  4. Protect from damage existing finish work that is to remain in place and becomes exposed during demolition operations.
  5. Protect floors with suitable coverings when necessary.
  6. Construct temporary insulated dustproof partitions where required to separate areas where noisy or extensive dirt or dust operations are performed. Equip partitions with dustproof doors and security locks.
  7. Provide temporary weather protection during interval between demolition and removal of existing construction on exterior surfaces and installation of new construction to ensure that no water leakage or damage occurs to structure or interior areas of existing building.
  8. Remove protections at completion of work.
- E. Damages: Promptly repair damages caused to adjacent facilities by demolition work.
- F. Traffic: Conduct selective demolition operations and debris removal to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities.
1. Do not close, block, or otherwise obstruct streets, walks, or other occupied or used facilities without written permission from City of Tucson and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by governing regulations.
- G. Flame Cutting: **Do not use cutting torches.**

- H. Utility Services: Maintain existing utilities indicated to remain in service and protect them against damage during demolition operations.
  - 1. Do not interrupt utilities serving occupied or used facilities, except when authorized in writing by authorities having jurisdiction. Provide temporary services during interruptions to existing utilities, as acceptable to governing authorities.
  - 2. Maintain fire protection services during selective demolition operations.
- I. Environmental Controls: Use water sprinkling, temporary enclosures, and other methods to limit dust and dirt migration. Comply with governing regulations pertaining to environmental protection.
  - 1. Do not use water when it may create hazardous or objectionable conditions such as flooding, and pollution.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Standards: Comply with ANSI/ASSE A10.6 and NFPA 241.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. General: Provide interior and exterior shoring, bracing, or support to prevent movement, settlement, or collapse of areas to be demolished and adjacent facilities to remain.
  - 1. Cease operations and notify Architect immediately if safety of structure appears to be endangered. Take precautions to support structure until determination is made for continuing operations.
  - 2. Cover and protect furniture, equipment, and fixtures from soilage or damage when demolition work is performed in areas where such items have not been removed.
  - 3. Erect and maintain dust-proof partitions and closures as required to prevent spread of dust or fumes to occupied portions of the building.
    - a. Where selective demolition occurs immediately adjacent to occupied portions of the building, construct dust-proof partitions of minimum 4-inch studs, 5/8-inch drywall (joints taped) on occupied side, 1/2-inch fire-retardant plywood on demolition side. Fill partition cavity with sound-deadening insulation.
  - 4. Provide weatherproof closures for exterior openings resulting from demolition work.
  - 5. Locate, identify, stub off, and disconnect utility services that are not indicated to remain.
    - a. Provide bypass connections as necessary to maintain continuity of service to occupied areas of building. Provide minimum of 72 hours advance notice to Owner if shutdown of service (except electrical service) is necessary during changeover. Shutdowns shall occur during off-hours.
    - b. Electrical service shall not be interrupted.

### 3.2 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.

- B. Existing Services/Systems to Be Removed, Relocated: Locate, identify, disconnect, and seal or cap off indicated utility services and mechanical/electrical systems serving areas to be selectively demolished.
- C. **Abandonment of existing services, mechanical or electrical distribution items will not be permitted. Items shall be removed if not in use.**

### 3.3 DEMOLITION

- A. General: Perform selective demolition work in a systematic manner. Use such methods as required to complete work indicated on Drawings in accordance with demolition schedule and governing regulations.
  - 1. Demolish concrete and masonry in small sections. Cut concrete and masonry at junctures with construction to remain using power-driven masonry saw or hand tools; do not use power-driven impact tools.
    - a. Locate demolition equipment throughout structure and promptly remove debris to avoid imposing excessive loads on supporting walls, floors, or framing.
  - 2. Provide services for effective air and water pollution controls as required by local authorities having jurisdiction.
  - 3. For interior slabs on grade, use removal methods that will not crack or structurally disturb adjacent slabs or partitions. Use power saw where possible.
- B. Completely fill below-grade areas and voids resulting from demolition work. Provide fill consisting of approved earth, gravel, or sand, free of trash and debris, stones over 6 inches in diameter, roots, or other organic matter.
- C. If unanticipated mechanical, electrical, or structural elements that conflict with intended function or design are encountered, investigate and measure both nature and extent of the conflict. Submit report to Architect in written, accurate detail. Pending receipt of directive from Architect, rearrange selective demolition schedule as necessary to continue overall job progress without undue delay.

### 3.4 SALVAGED MATERIALS

- A. Salvaged Items: Where indicated on Drawings as "Salvage - Deliver to Owner," carefully remove indicated items, clean, store, and turn over to Owner and obtain receipt.

### 3.5 DISPOSAL OF DEMOLISHED MATERIALS

- A. Remove from building site debris, rubbish, and other materials resulting from demolition operations. Transport and legally dispose off site.
  - 1. If hazardous materials are encountered during demolition operations, comply with applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.
  - 2. Burning of removed materials is not permitted on project site.
  - 3. Do not transport debris through occupied interior areas.
- B. Special care shall be used for removal and control of debris in or near the air operations area. Spilled debris shall be swept up immediately. Debris removal shall be during off-hours.

3.6 CLEANUP AND REPAIR

- A. General: Upon completion of demolition work, remove tools, equipment, and demolished materials from site. Remove protections and leave interior areas broom clean.
  - 1. Repair demolition performed in excess of that required. Return elements of construction and surfaces to remain to condition existing prior to start operations. Repair adjacent construction or surfaces soiled or damaged by selective demolition work.

END OF SECTION 02 41 19

## SECTION 02 41 26

### REMOVAL OF EXISTING IMPROVEMENTS

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Removal of selected site elements.

##### 1.2 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to the work area. Conduct removal of existing improvements so Owner's operations will not be disrupted.
- B. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with removal.
- C. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- D. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during removal operations.

#### PART 2 - PRODUCTS

##### 2.1 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with governing EPA, WGAA, ADEQ, and Coconino County Health Department regulations before beginning selective demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.

#### PART 3 - EXECUTION

##### 3.1 DESCRIPTION

- A. Remove Structures: Remove structures specifically identified on the drawings.
- B. Removal of concrete curb and gutter: Remove concrete curb and gutter, single curb, and valley gutter specifically identified on the drawings.
- C. Removal of Storm Drain Pipe: Remove storm drain pipe specifically identified on the drawings.
- D. Removal of Bituminous Pavement:

1. Pavement cut and removal is necessary to clear the area for excavation and construction, terminal construction and area grading. Remove as indicated. Pavement cutting shall be included in the work of pavement removal.
  2. Cutting and removing pavement necessitated by the installation of underground utilities shall be included in the Work.
- E. Removal of Fence: Remove fence specifically identified on the drawings including footings.
- F. Removal of Water Pipe: Remove storm drain pipe specifically identified on the drawings including fittings.
- G. Removal of Light Poles: Remove light poles, light fixtures, foundation, electrical conduit and wiring to the extent indicated on the electrical drawings.

### 3.2 PREPARATION

- A. Site Access and Temporary Controls: Conduct removal of improvements and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.
- B. Temporary Facilities: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
- C. Temporary Shoring: Provide and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being removed.

### 3.3 DISPOSAL OF REMOVED MATERIALS

- A. Disposal: Transport demolished materials off Owner's property and legally dispose of them.
1. Do not allow materials to accumulate on-site.
  2. Remove and transport debris in a manner that will prevent spillage on adjacent surfaces and areas.

END OF SECTION 02 41 26

SECTION 03 30 00

CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
  - 2. Product Data for Credit IEQ 4.3: For liquid floor treatments and curing and sealing compounds, documentation including printed statement of VOC content.
  - 3. Design Mixtures for Credit ID 1.1: For each concrete mixture containing fly ash as a replacement for portland cement or other portland cement replacements, and for equivalent concrete mixtures that do not contain portland cement replacements.
- C.
- D. Design Mixtures: For each concrete mixture.
- E. Shop Drawings: For steel reinforcement. Material test reports.

1.3 QUALITY ASSURANCE

- A. 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.
- B. 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."
- C. Preinstallation Conference: Conduct conference at Project site.

1.4 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement.
- B. Waterstops: Store waterstops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

## PART 2 - PRODUCTS

### 2.1 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.
- 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.

### 2.2 STEEL REINFORCEMENT

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Epoxy-Coated Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed bars, ASTM A 775/A 775M or ASTM A 934/A 934M, epoxy coated, with less than 2 percent damaged coating in each 12-inch (300-mm) bar length.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, plain, fabricated from as-drawn steel wire into flat sheets.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497, flat sheet.
- E. 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."
- F. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut true to length with ends square and free of burrs.
- G. Epoxy-Coated Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, ASTM A 775/A 775M epoxy coated.
- H. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 775M.

### 2.3 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 or II. Supplement with the following:
    - a. Fly Ash: ASTM C 618, Class F.
- B. Normal-Weight Aggregates: ASTM C 33, graded, 1-1/2-inch (38-mm) nominal maximum coarse-aggregate size.
  - 1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M and potable.
- D. Chemical Admixtures may only be used where permitted by Architect. Admixtures shall be 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. Admixtures, where permitted, shall conform to the following specifications:

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.
  7. Air-Entraining Admixture: ASTM C 260.
- E. Color Pigment: ASTM C 979, synthetic mineral-oxide pigments or colored water-reducing admixtures; color stable, free of carbon black, nonfading, and resistant to lime and other alkalis.

## 2.4 WATERSTOPS

- A. Flexible Rubber Waterstops: CE CRD-C 513, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.
1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Greenstreak.
    - b. Williams Products, Inc.
  2. Profile: Flat, dumbbell with center bulb.
  3. Dimensions: 9 inches by 3/8 inch thick (225 mm by 10 mm thick); nontapered.

## 2.5 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class A, 10 mil. or thicker. Include manufacturer's recommended adhesive or pressure-sensitive tape.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Carlisle Coatings & Waterproofing, Inc.; Blackline 400.
    - b. Fortifiber Building Systems Group; Moistop Ultra 10.
    - c. Grace Construction Products, W. R. Grace & Co.; Florprufe 120.
    - d. Insulation Solutions, Inc.; Viper VaporChec 10.
    - e. Meadows, W. R., Inc.; Perminator 10 mil.
    - f. Raven Industries Inc.; Vapor Bloc 10.
    - g. Reef Industries, Inc.; Griffolyn 10 mil Green.
    - h. Stego Industries, LLC; Stego Wrap 10 mil Class A.

## 2.6 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.

## 2.7 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1752, cork or self-expanding cork.

## 2.8 CONCRETE MIXTURES

- 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.
- B. Proportion normal-weight concrete mixture as follows:
  - 1. Minimum Compressive Strength: As indicated in General Structural Notes, sheet S001.
  - 2. Slump Limit: 4 inches (100 mm) and 8 inches (200 mm) for concrete with verified slump of 2 to 4 inches (50 to 100 mm) before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch (25 mm).

## 2.9 FABRICATING REINFORCEMENT

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

## 2.10 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
  - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## 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. Chamfer exterior corners and edges of permanently exposed concrete.

### 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.

### 3.3 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 (150 mm) and seal with manufacturer's recommended tape.

### 3.4 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.

### 3.5 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.
- 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 (3.2 mm). 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- (3.2-mm-) 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.

### 3.6 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. 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. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
- C. Hot-Weather Placement: Comply with ACI 301.
- D. Cold-Weather Placement: Comply with ACI 301.

### 3.7 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed waterstops during progress of the Work. Field fabricate joints in waterstops according to manufacturer's written instructions.

### 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, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
  - 1. Apply float finish to surfaces to receive trowel finish.
- C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
  - 1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
  - 2. Finish and measure surface so gap at any point between concrete surface and an unleveled, freestanding, 10-foot- (3.05-m-) long straightedge resting on 2 high spots and placed anywhere on the surface does not exceed 1/8 inch (3.2 mm)
- D. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated. While concrete is still plastic, slightly scarify surface with a fine broom.
  - 1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.

### 3.10 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 (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. 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.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  - 3. Curing Compound: Use of curing compound will not be permitted.

### 3.11 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.

### 3.12 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
  - 1. Testing Services: Tests shall be performed according to ACI 301.

END OF SECTION 03 30 00

SECTION 04 22 00

CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Concrete masonry units.
  - 2. Polished veneer concrete masonry units.
  - 3. Mortar and grout.
  - 4. Steel reinforcing bars.
  - 5. Masonry joint reinforcement.
  - 6. Miscellaneous masonry accessories.

1.3 DEFINITIONS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
  - 1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
- C. Shop Drawings: For the following:
  - 1. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement."
  - 2. Show embedded items on wall elevations with corresponding heights.
- D. Samples for Verification: For each type and color of the following:
  - 1. CMU polished veneer units.
  - 2. Pigmented mortar. Make Samples using same sand and mortar ingredients to be used on Project.
  - 3. Accessories embedded in masonry.
- E. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

## 1.5 QUALITY ASSURANCE

- A. Source Limitations for Masonry Units: Obtain exposed masonry units of a uniform texture and color, or a uniform blend within the ranges accepted for these characteristics, from single source from single manufacturer for each product required.
- B. Source Limitations for Mortar Materials: Obtain mortar ingredients of a uniform quality, including color for exposed masonry, from single manufacturer for each cementitious component and from single source or producer for each aggregate.
- C. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockups for each type of exposed unit masonry construction in sizes approximately 72 inches (1800 mm) long by 48 inches (1200 mm) high by full thickness, including face and backup wythes and accessories.
    - a. Include a sealant-filled joint at least 16 inches (400 mm) long in mockup.
    - b. Include lower corner of window opening at upper corner of exterior wall mockup. Make opening approximately 12 inches (300 mm) wide by 16 inches (400 mm) high.
  - 2. Protect accepted mockups from the elements with weather-resistant membrane.
  - 3. Approval of mockups is for color, texture, and blending of masonry units; relationship of mortar and sealant colors to masonry unit colors; tooling of joints; and aesthetic qualities of workmanship.
    - a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
    - b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless such deviations are specifically approved by Architect in writing.
    - c. Sample wall shall receive water repellent as specified in Section 07 19 00.
    - d. Upon completion of Project, remove sample wall from site and dispose of in a legal manner.
- E. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Section 01 31 00 "Project Management and Coordination."

## 1.6 DELIVERY, STORAGE, AND HANDLING

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

## 1.7 PROJECT CONDITIONS

- A. Protection of Masonry: During construction, cover tops of walls, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.
- B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. Protect sills, ledges, and projections from mortar droppings.
  - 3. Protect surfaces of window and door frames, as well as similar products with painted and integral finishes, from mortar droppings.
  - 4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.
- C. Cold-Weather Requirements: Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.
- D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

## PART 2 - PRODUCTS

### 2.1 MASONRY UNITS, GENERAL

- A. Defective Units: Referenced masonry unit standards may allow a certain percentage of units to contain chips, cracks, or other defects exceeding limits stated in the standard. Do not use units where such defects will be exposed in the completed Work.
- B. Fire-Resistance Ratings: Where indicated, provide units that comply with requirements for fire-resistance ratings indicated as determined by testing according to ASTM E 119, by equivalent masonry thickness, or by other means, as acceptable to authorities having jurisdiction.

### 2.2 MANUFACTURERS

- A. Basis of Design: Drawings are based on products by Superlight Block, an Oldcastle Company, Arizona. Subject to compliance with requirements, products of the manufacturers that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Superlite, an Oldcastle Company, Arizona.
  - 2. Western Block Company, Arizona.
  - 3. Cind-R-lite Block Company, Las Vegas, NV.
- B. Polished Ground Face Masonry Units and Filled-Polished Masonry Units: Drawings are based on "Tredstone" and "Tredstone Plus," by Superlight Block, an Oldcastle Company, Arizona. Other products may be incorporated into the Work, subject to compliance with requirements and approval of the Architect

### 2.3 STANDARD CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
  2. Provide square-edged units for outside corners unless otherwise indicated.
- B. Integral Water Repellent: Provide units made with integral water repellent.
1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested according to ASTM E 514 as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, shall show no visible water or leaks on the back of test specimen.
- C. CMUs: ASTM C 90.
1. Density Classification: Medium weight, unless otherwise indicated.
  2. Size: Manufactured to specified dimensions of 3/8 inch less than nominal widths by nominal heights by nominal lengths indicated on drawings (nominal dimensions 12" X 8" 16", 8" X 8" X 16", 8" X 4" X 16" and as indicated).
  3. Exposed Faces: Provide center score, medium texture matching the range represented by Architect approved sample.
  4. Color: Natural gray.

#### 2.4 GROUND FACE AND FILLED GROUND FACE CMU

- A. Manufacture to provide finished dimensions of 7-5/8" x 15-5/8"  $\pm$  1/8". Bed depth dimensions for single face units are 3-9/16", 5-9/16", 7-9/16", 11-9/16"  $\pm$  1/8".
1. Single face units.
  2. Nominal 2 inch and 4 inch standard block thicknesses as indicated.
  3. Provide standard block shapes.
  4. Medium weight or stronger (105 pcf or greater).
  5. Colors:
    - a. Ground Filled Face (2"): "Seashell."
    - b. Ground Filled Face (4"): "Opal."
    - c. Ground Face (4"): "Opal," with heavy seal.
    - d. Ground Face (4"): "Black Canyon," with heavy seal.
- B. Provide colored mortar is from ground face CMU manufacturer.
1. Type S, unless noted otherwise.
  2. For exterior mortar, use matching manufacturer-approved water repellent mortar admixture following ground face CMU manufacturer's instructions. Consult manufacturer for recommendations.
- C. **Do not use muriatic acid solution or any cleaner with an acid base on ground face units.**

#### 2.5 MASONRY LINTELS

- A. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from "U" block CMU with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

## 2.6 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction. Provide natural color cement.
- B. Mortar shall not contain fly ash or sodium chloride.
- C. Hydrated Lime: ASTM C 207, Type S.
- D. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- E. Aggregate for Mortar: ASTM C 144.
  - 1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
  - 2. For joints less than 1/4 inch (6 mm) thick, use aggregate graded with 100 percent passing the No. 16 (1.18-mm) sieve.
- F. Aggregate for Grout: ASTM C 404.
- G. Water-Repellent Admixture: Liquid water-repellent mortar admixture intended for use with CMUs, containing integral water repellent by same manufacturer.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. ACM Chemistries, Inc.; RainBloc for Mortar.
    - b. BASF Aktiengesellschaft; Rheopel Mortar Admixture.
    - c. Grace Construction Products, W. R. Grace & Co. - Conn.; Dry-Block Mortar Admixture.
- H. Water: Potable.

## 2.7 REINFORCEMENT

- A. Uncoated Steel Reinforcing Bars: ASTM A 615/A 615M or ASTM A 996/A 996M, Grade 60 (Grade 420).
- B. Masonry Joint Reinforcement, General: ASTM A 951/A 951M.
  - 1. Walls: Hot-dip galvanized, carbon steel.
  - 2. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
  - 3. Wire Size for Cross Rods: 0.148-inch (3.77-mm) diameter.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Either ladder or truss type with single pair of side rods.

## 2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene, urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.

- C. Bond-Breaker Strips: Asphalt-saturated, organic roofing felt complying with ASTM D 226, Type I (No. 15 asphalt felt).
- D. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Dayton Superior Corporation, Dur-O-Wal Division; D/A 810, D/A 812 or D/A 817.
    - b. Heckmann Building Products Inc.; No. 376 Rebar Positioner.
    - c. Hohmann & Barnard, Inc.; #RB or #RB-Twin Rebar Positioner.
    - d. Wire-Bond; O-Ring or Double O-Ring Rebar Positioner.

## 2.9 MASONRY CLEANERS

- A. Follow ground face CMU manufacturer's instructions, use Burnished Custom Masonry Cleaner by PROSOCO (dilute 1 part to 3 parts clean water). Available from manufacturer. **Do not powerwash.**

## 2.10 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
  - 1. Do not use calcium chloride in mortar or grout.
  - 2. Use portland cement-lime, masonry cement, or mortar cement mortar unless otherwise indicated.
- B. Mortar for Unit Masonry: Comply with ASTM C 270, Proportion Specification. Provide the following types of mortar for applications stated unless another type is indicated or needed to provide required compressive strength of masonry.
  - 1. For masonry below grade or in contact with earth, use Type S.
  - 2. For reinforced masonry, use Type S.
- C. Grout for Unit Masonry: Comply with ASTM C 476.
  - 1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with Table 1.15.1 in ACI 530.1/ASCE 6/TMS 602 for dimensions of grout spaces and pour height.
  - 2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi (14 MPa).
  - 3. Provide grout with a slump of 8 to 11 inches (203 to 279 mm) as measured according to ASTM C 143/C 143M.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
  - 1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of work.
  - 2. Verify that foundations are within tolerances specified.
  - 3. Verify that reinforcing dowels are properly placed.

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

### 3.2 INSTALLATION, GENERAL

- A. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

### 3.3 LAYING MASONRY WALLS

- A. Draw blocks from more than one pallet at a time during installation. Exterior mortar shall include manufacturer-approved matching water-repellent additive added to each batch in the appropriate dosage rates for mortar type per manufacturer's instructions.
- B. Lay units using the best concrete masonry practices. Install only quality units; reject all defective units as defined by ASTM C90. Lay blocks with the faces level, plumb and true to the line strung horizontally at the ground or filled and polished face. Units shall have uniform, 3/8"-wide joints both horizontally and vertically on the finished side of the wall. Tool joints neatly after they are finger-hard to make them straight and uniform. Size and place cut pieces appropriately to maintain consistency and bond.
- C. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- D. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- E. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 4-inches (100-mm). Bond and interlock each course of each wythe at corners. Do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- F. Stopping and Resuming Work: Stop work by racking back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar before laying fresh masonry.
- G. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- H. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.
- I. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- J. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

### 3.4 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
  - 1. With face shells fully bedded in mortar and with head joints of depth equal to bed joints.
  - 2. With webs fully bedded in mortar in all courses of piers, columns, and pilasters.

3. With webs fully bedded in mortar in grouted masonry, including starting course on footings.
  4. With entire units, including areas under cells, fully bedded in mortar at starting course on footings where cells are not grouted.
- B. Lay units with full mortar coverage on head and bed joints taking care not to block cores to be grouted or filled with masonry insulation.
  - C. Tool all mortar joints when thumbprint hard into a concave configuration.
  - D. Care should be taken to remove mortar from the face of masonry units before it sets.
  - E. Tuckpoint the joints of scored units for proper appearance. All exterior scored units must be tuckpointed to prevent water penetration. **NO RAKE JOINTS.**
  - F. Lay solid masonry units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
  - G. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
  - H. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

### 3.5 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
  1. Space reinforcement not more than 16 inches (406 mm) o.c.
  2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
  3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at corners by using prefabricated L-shaped units.

### 3.6 CONTROL AND EXPANSION JOINTS

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

### 3.7 LINTELS

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

### 3.8 FIELD COAT APPLICATION

- A. For completely finished walls, apply a finish coat of TRENDCOAT® Acrylic (minimum 20% solids content) or TRENDCOAT® WB (water-base). Apply to walls after cleandown and when the walls are dry. Apply the acrylic evenly to cover the entire surface without forming drips or runs. For maximum coverage and best appearance, apply TRENDCOAT Acrylic or TRENDCOAT WB with airless spray equipment. Consult manufacturer for further information. This clear, high-solids acrylic, provides moisture resistance and helps to cover any scuffs or scratches that may occur during handling and/or installation.

### 3.9 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
- B. Placing Reinforcement: Comply with requirements in ACI 530.1/ASCE 6/TMS 602.
- C. Grouting: Do not place grout until entire height of masonry to be grouted has attained enough strength to resist grout pressure.
  - 1. Comply with requirements in ACI 530.1/ASCE 6/TMS 602 for cleanouts and for grout placement, including minimum grout space and maximum pour height.

### 3.10 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas, as needed to perform tests and inspections. Retesting of materials that fail to meet specified requirements shall be done at Contractor's expense.
- B. Testing Prior to Construction: One set of tests.
- C. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.
- D. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for compressive strength.
- E. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.
- F. Prism Test: For each type of construction provided, according to ASTM C 1314 at 7 days and at 28 days.

### 3.11 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.

- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  - 3. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

END OF SECTION 04 22 00

SECTION 05 12 00

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."
- 3. Division 05 Section "Metal Fabrications" for miscellaneous steel fabrications and other metal items not defined as structural steel.
- 4. Division 05 Section "Metal Pan Stairs."

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."
- B. Seismic-Load-Resisting System: Elements of structural-steel frame designated as "SLRS" or along grid lines designated as "SLRS" on Drawings, including columns, beams, and braces and their connections.
- C. Heavy Sections: Rolled and built-up sections as follows:
  - 1. Shapes included in ASTM A 6/A 6M with flanges thicker than 1-1/2 inches (38 mm).
  - 2. Welded built-up members with plates thicker than 2 inches (50 mm).
  - 3. Column base plates thicker than 2 inches (50 mm).
- D. Demand Critical Welds: Those welds, the failure of which would result in significant degradation of the strength and stiffness of the Seismic-Load-Resisting System and which are indicated as "Demand Critical" or "Seismic Critical" on Drawings.

1.4 PERFORMANCE REQUIREMENTS

- A. Connections: Provide details of 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 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings: Show fabrication of structural-steel components.
  - 1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
  - 2. Include embedment drawings.
  - 3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
  - 4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.
  - 5. Identify members and connections of the seismic-load-resisting system.
  - 6. Indicate locations and dimensions of protected zones.
  - 7. Identify demand critical welds.
  - 8. For structural-steel connections indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. 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, including the following:
  - 1. Power source (constant current or constant voltage).
  - 2. Electrode manufacturer and trade name, for demand critical welds.

## 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified fabricator.
- B. Welding certificates.
- C. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- D. Mill test reports for structural steel, including chemical and physical properties.
- E. Product Test Reports: For the following:
  - 1. Bolts, nuts, and washers including mechanical properties and chemical analysis.
  - 2. Shop primers.
  - 3. Nonshrink grout.
- F. Source quality-control reports.

## 1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A qualified fabricator that participates in the AISC Quality Certification Program and is designated an AISC-Certified Plant, Category STD.

- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category CSE.
- C. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 1. Welders and welding operators performing work on bottom-flange, demand-critical welds shall pass the supplemental welder qualification testing, as required by AWS D1.8. FCAW-S and FCAW-G shall be considered separate processes for welding personnel qualification.
- D. 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."
- E. Preinstallation Conference: Conduct conference at Project site.

## 1.8 DELIVERY, STORAGE, AND HANDLING

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

## 1.9 COORDINATION

- A. 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 PERFORMANCE REQUIREMENTS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

### 2.2 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.

- B. Channels, Angles C and MC-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Square and Rectangular HSS Sections (Structural Tubing): ASTM A 500, Grade B (Fy = 46 ksi).
  - 1. Weight Class: Standard
  - 2. Finish: Black
- E. Welding Electrodes: Comply with AWS requirements.

### 2.3 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325-N, Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
- B. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- C. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
  - 1. Nuts: ASTM A 563 (ASTM A 563M)hex carbon steel.
  - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
  - 3. Washers: ASTM F 436 (ASTM F 436M), Type 1, hardened carbon steel.
  - 4. Finish: Plain.

### 2.4 PRIMER

- A. Primer: Fabricator's standard lead- and chromate-free, nonasphaltic, rust-inhibiting primer complying with MPI#79 and compatible with topcoat.

### 2.5 GROUT

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

### 2.6 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 where indicated.
  - 2. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
  - 3. Mark and match-mark materials for field assembly.
  - 4. 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. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- F. 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. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

## 2.7 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.

## 2.8 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 (50 mm).
  - 2. Surfaces to be high-strength bolted with slip-critical connections.
  - 3. 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 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 (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

## 2.9 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 may 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.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
  - 1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
  - 2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete-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.
  - 1. Do not remove temporary shoring supporting composite deck construction until cast-in-place concrete has attained its design compressive strength.

### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base and Bearing Plates: Clean concrete-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. Weld plate washers to top of baseplate.
  - 3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
  - 4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.
- C. Maintain erection tolerances of structural steel within AISC'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.
- H. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.

### 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[ and AWS D1.8/D1.8M] 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. 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 may 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. 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.
  - 2. Apply same type primer as shop primer used on adjacent surfaces.

END OF SECTION 05 12 00

SECTION 05 21 00

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.
- B. Refer to General Structural Notes on the drawings.

1.2 SUMMARY

- A. Section Includes:
  - 1. K-series and KCS-series steel joists.
  - 2. Joist girders, open web G-series.
  - 3. Joist accessories.
- B. Related Requirements:
  - 1. Section 03 30 00 "Cast-in-Place Concrete" for installing bearing plates in concrete.
  - 2. Section 04 22 00 "Concrete Unit Masonry" for installing bearing plates in unit masonry.
  - 3. Section 05 12 00 "Structural Steel Framing" for field-welded shear connectors.

1.3 DEFINITIONS

- A. SJI's "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."
- B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support non-uniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of joist, accessory, and product.
- B. LEED Submittals:
- C. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content
- D. Shop Drawings:
  - 1. Include layout, designation, number, type, location, and spacing of joists.
  - 2. Include joining and anchorage details, bracing, bridging, and joist accessories; splice and connection locations and details; and attachments to other construction.
  - 3. Indicate locations and details of bearing plates to be embedded in other construction.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Manufacturer certificates.
- C. Comprehensive engineering analysis of special joists signed and sealed by a qualified professional engineer registered in Arizona and responsible for its preparation.

## 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A manufacturer certified by SJI to manufacture joists complying with applicable standard specifications and load tables in SJI's "Specifications."
  - 1. Manufacturer's responsibilities include providing professional engineering services for designing special joists to comply with performance requirements.
- B. Welding Qualifications: Qualify field-welding procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

## 1.7 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.

## 1.8 SEQUENCING

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

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide special joists and connections capable of withstanding design loads indicated.
  - 1. Design special joists to withstand design loads with live-load deflections no greater than the following:
    - a. Roof Joists: Vertical deflection of 1/240 of the span.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

### 2.2 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. Provide holes in chord members for connecting and securing other construction to joists.
- D. Extended Ends: Extend bearing ends of joists with SJI's Type R extended ends where indicated, complying with SJI's "Specifications."
- 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 (1:48).

### 2.3 JOIST GIRDERS

- A. Manufacture joist girders according to "Standard Specifications for Joist Girders" in SJI's "Specifications," with steel-angle top- and bottom-chord members; with end and top-chord arrangements as indicated.
- B. Provide holes in chord members for connecting and securing other construction to joist girders.
- C. Camber joist girders according to SJI's "Specifications."
- D. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches (1:48).

### 2.4 PRIMERS

- A. Primer: SSPC-Paint 15, or manufacturer's standard shop primer complying with performance requirements in SSPC-Paint 15.

### 2.5 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. Fabricate steel bearing plates from ASTM A 36/A 36M steel with integral anchorages of sizes and thicknesses indicated. Shop prime paint.
- C. Furnish ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch (13 mm) of finished wall surface unless otherwise indicated.
- D. Welding Electrodes: Comply with AWS standards.
- E. Furnish miscellaneous accessories including splice plates and bolts required by joist manufacturer to complete joist assembly.

## 2.6 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.
- C. Apply one coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil (0.025 mm) thick.

## 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.
- B. 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 are applied.
- C. Field weld joists to supporting steel bearing plates. 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. 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 to perform field tests and inspections and prepare test and inspection reports.
- B. Visually inspect field welds according to AWS D1.1/D1.1M.
  - 1. In addition to visual inspection, field welds may be tested according to AWS D1.1/D1.1M and the following procedures, as applicable:
    - a. Liquid Penetrant Inspection: ASTM E 165.
    - b. Magnetic Particle Inspection: ASTM E 709.

- c. Ultrasonic Testing: ASTM E 164.
  - d. Radiographic Testing: ASTM E 94.
- C. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.
- D. Perform additional testing to determine compliance of corrected Work with specified requirements.

#### 3.4 PROTECTION

- A. 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 according to SSPC-SP 2, or power-tool cleaning according to SSPC-SP 3.
  - 2. Apply a compatible primer of same type as primer used on adjacent surfaces.
- B. 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 05 21 00

SECTION 05 31 00

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. Section Includes:

- 1. Roof deck.

B. Related Requirements:

- 1. Section 03 30 00 "Cast-in-Place Concrete" for structural concrete fill over steel deck.
- 2. Section 05 12 00 "Structural Steel Framing".
- 3. Section 05 50 00 "Metal Fabrications."

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.

B. LEED Submittals:

- 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

C. Shop Drawings:

- 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.

1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.

- B. Product Certificates: For each type of steel deck.

- C. Evaluation Reports: For steel deck.

- D. Field quality-control reports.

## 1.5 QUALITY ASSURANCE

- A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- B. FM Global Listing: Provide steel roof deck evaluated by FM Global and listed in its "Approval Guide, Building Materials" for Class 1 fire rating and Class 1-90 windstorm ratings.

## 1.6 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.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

### 2.2 ROOF DECK

- A. 1-1/2 Inch Deep Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 31, and with the following:
  - 1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), zinc coating.
  - 2. Deck Profile: Type N.
  - 3. Profile Depth: 1-1/2 inches (38 mm).
  - 4. Design Uncoated-Steel Thickness: 0.0474 inch (1.20 mm) minimum (18 gage).
  - 5. Span Condition: As indicated.
  - 6. Side Laps: Interlocking side laps. Top seam weld with 1-1/2 inch long weld, at 12 inches on center.

### 2.3 COMPOSITE FLOOR DECK

- A. Composite Floor Deck: Fabricate panels, with integrally embossed or raised pattern ribs and interlocking side laps, to comply with "SDI Specifications and Commentary for Composite Steel Floor Deck," in SDI Publication No. 31, with the minimum section properties indicated, and with the following:
  - 1. Galvanized-Steel Sheet: ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), zinc coating.
  - 2. Profile Depth: 3 inches (76 mm).
  - 3. Design Uncoated-Steel Thickness: 0.0358 inch (0.91 mm) 20 gage.
  - 4. Span Condition: Triple span or more.

## 2.4 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: Welded top seam welds.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), not less than 0.0359-inch (0.91-mm) design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch (1.52 mm) thick, with factory-punched hole of 3/8-inch (9.5-mm) minimum diameter.
- G. Recessed Sump Pans: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch- (76-mm-) wide flanges and recessed pans of 1-1/2-inch (38-mm) minimum depth. For drains, cut holes in the field.
- H. 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.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 31, 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.
  - 1. Align cellular deck panels over full length of cell runs and align cells at ends of abutting panels.
- 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 DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of  $\frac{3}{4}$  inch to 1 inch weld dimensions (1/2 inch diameter fusion area) and as follows:
  - 1. To transverse supports: Joists, beams, angles, plates, etc., 5 welds per sheet. Weld each side of seam and three intermediate flutes.
  - 2. To steel parallel to flutes, 12 inches on center.
  - 3. To each flute and at 6 inches on center at opening edges: 1-1/2 inch long top seam weld at 12 inches on center.
  - 4. Side laps: 1-1/2 inch long top seam weld at 12 inches on center.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding 12 inches long and fastened with a minimum of 1-1/2-inch- (38-mm-) long welds.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints butted.
- D. Roof Sump Pans and Sump Plates: Install over openings provided in roof deck and weld flanges to top of deck. Space welds not more than 12 inches (305 mm) apart with at least one weld at each corner.

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- 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 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 05 31 00

SECTION 05 40 00

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. Section Includes:
  - 1. C-shaped load-bearing wall framing.
- B. Related Requirements:
  - 1. Section 05 50 00 "Metal Fabrications."
  - 2. Section 09 22 16 "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.
  - 3. Section 09 21 16 "Gypsum Board Shaft Wall Assemblies" for interior non-load-bearing, metal-stud-framed, shaft-wall assemblies.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of cold-formed steel framing product and accessory.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings:
  - 1. Include layout, spacings, sizes, thicknesses, and types of cold-formed steel framing; fabrication; and fastening and anchorage details, including mechanical fasteners.
  - 2. Indicate reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.

1.4 QUALITY ASSURANCE

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

## 1.5 DELIVERY, STORAGE, AND HANDLING

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

## PART 2 - PRODUCTS

### 2.1 COLD-FORMED STEEL FRAMING, GENERAL

- A. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
  - 1. Grade: ST50H (ST340H).
  - 2. Coating: G60 (Z180), A60 (ZF180), AZ50 (AZ150), or GF30 (ZGF90).
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

### 2.2 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. Typical Steel Studs: Unless indicated otherwise
    - a. Minimum Base-Metal Thickness: 0.0566 inch (16 gage).
    - b. Flange Width: 1-5/8 inches (41 mm).
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with straight flanges, and as follows:
  - 1. Typical Steel Studs: Unless indicated otherwise
    - a. Minimum Base-Metal Thickness: 0.0566 inch (16 gage).
    - b. Flange Width: minimum 1.37 inches.

### 2.3 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.

### 2.4 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. Expansion Anchors: Fabricated from corrosion-resistant materials, with allowable load or strength design capacities calculated according to ICC-ES AC193 and ACI 318 greater than or equal to the design load, as determined by testing per ASTM E 488 conducted by a qualified testing agency.
- C. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with allowable load capacities calculated in accordance with ICC-ES AC70,

greater than or equal to the design load, as determined by testing per ASTM E 1190 conducted by a qualified testing agency.

- D. 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.
- E. Welding Electrodes: Comply with AWS standards.

## 2.5 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: SSPC-Paint 20 or MIL-P-21035 or ASTM A 780.
- B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, and plasticizing and water-reducing agents, complying with ASTM C 1107, with fluid consistency and 30-minute working time.
- C. Shims: Load bearing, high-density multimonomer plastic, nonleaching; or of cold-formed steel of same grade and coating as framing members supported by shims.

## 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.
- C. Install load bearing shims or grout between the underside of load-bearing wall bottom track and the top of foundation wall or slab at locations with a gap larger than 1/4 inch (6 mm) to ensure a uniform bearing surface on supporting concrete or masonry construction.

### 3.3 INSTALLATION, GENERAL

- A. Cold-formed steel framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed steel framing according to AISI S200 and to manufacturer's written instructions unless more stringent requirements are indicated.

- C. Install cold-formed steel framing and accessories plumb, square, and true to line, and with connections securely fastened.
  - 1. Cut framing members by sawing or shearing; do not torch cut.
  - 2. Fasten cold-formed steel framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3/D1.3M requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- D. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.
- E. 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.
- F. Do not bridge building expansion joints with cold-formed steel framing. Independently frame both sides of joints.
- G. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's approved or standard punched openings.
- H. Erection Tolerances: Install cold-formed steel framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
  - 1. Space individual framing members no more than plus or minus 1/8 inch (3 mm) from plan location. Cumulative error shall not exceed minimum fastening requirements of sheathing or other finishing materials.

#### 3.4 LOAD-BEARING WALL INSTALLATION

- A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately and securely anchor at corners and ends, and at spacings as follows:
  - 1. Anchor Spacing: 24 inches (610 mm).
- B. Squarely seat studs against top and bottom tracks with gap not exceeding of 1/8 inch (3 mm) between the end of wall framing member and the web of track. Fasten both flanges of studs to top and bottom tracks. Space studs as follows:
  - 1. Stud Spacing: 16 inches (406 mm).
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar configurations.
- D. Align studs vertically where floor framing interrupts wall-framing continuity. Where studs cannot be aligned, continuously reinforce track to transfer loads.
- E. Anchor studs abutting structural columns or walls, including masonry walls, to supporting structure as indicated.
- F. Install headers over wall openings wider than stud spacing. Locate headers above openings as indicated. Fabricate headers of compound shapes indicated or required to transfer load to supporting studs, complete with clip-angle connectors, web stiffeners, or gusset plates.

1. Frame wall openings with not less than a double stud at each jamb of frame as indicated on Shop Drawings. Fasten jamb members together to uniformly distribute loads.
  2. Install runner tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with clip angles or by welding, and space jack studs same as full-height wall studs.
- G. Install supplementary framing, blocking, and bracing in stud framing indicated to support fixtures, equipment, services, casework, heavy trim, furnishings, and similar work requiring attachment to framing.
1. If type of supplementary support is not indicated, comply with stud manufacturer's written recommendations and industry standards in each case, considering weight or load resulting from item supported.
- H. Install horizontal bridging in stud system, spaced vertically as indicated. Fasten at each stud intersection.
- I. Install miscellaneous framing and connections, including supplementary framing, web stiffeners, clip angles, continuous angles, anchors, and fasteners, 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 steel framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed steel framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 40 00

SECTION 05 50 00  
METAL FABRICATIONS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Steel framing and supports for operable partitions.
- 2. Steel framing and supports for countertops.
- 3. Steel framing and supports for mechanical and electrical equipment.
- 4. Steel framing and supports for applications where framing and supports are not specified in other Sections.
- 5. Metal ladders.

B. Related Sections:

- 1. Division 3 Section "Cast-in-Place Concrete" for installing anchor bolts, steel pipe sleeves, slotted-channel inserts, wedge-type inserts and other items cast into concrete.
- 2. Division 5 Section "Structural Steel."

1.3 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

- 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

1.4 SUBMITTALS

A. Product Data: For the following:

- 1. Paint products.
- 2. Grout.

B. LEED Submittals:

- 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

- C. Shop Drawings: Show fabrication and installation details for metal fabrications. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.

- 1. Steel framing and supports for ceiling-hung toilet compartments.

2. Steel framing and supports for operable partitions.
3. Steel framing and supports for countertops.
4. Steel framing and supports for mechanical and electrical equipment.
5. Steel framing and supports for applications where framing and supports are not specified in other Sections.
6. Metal ladders.

D. Welding certificates.

#### 1.5 QUALITY ASSURANCE

A. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

B. Welding Qualifications: Qualify procedures and personnel according to the following:

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
3. AWS D1.6, "Structural Welding Code - Stainless Steel."

#### 1.6 PROJECT CONDITIONS

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

#### 1.7 COORDINATION

A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

B. Coordinate installation of anchorages and steel weld plates and angles for casting into concrete. 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.

### PART 2 - PRODUCTS

#### 2.1 METALS, GENERAL

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

B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.

#### 2.2 FERROUS METALS

A. Steel Plates, Angles, Shapes, and Bars: ASTM A 36/A 36M.

B. Steel Tubing: ASTM A 500, cold-formed steel tubing.

- C. Steel Pipe: ASTM A 53/A 53M, standard weight (Schedule 40) unless otherwise indicated.

## 2.3 FASTENERS

- A. General: Unless otherwise indicated, provide Type 304 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, at exterior walls. Select fasteners for type, grade, and class required.

## 2.4 MISCELLANEOUS MATERIALS

- A. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- D. Concrete: Comply with requirements in Division 3 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

## 2.5 FABRICATION, GENERAL

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

- I. Provide for anchorage of type indicated; coordinate with supporting structure. Space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
  1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors, 1/8 by 1-1/2 inches (3.2 by 38 mm), with a minimum 6-inch (150-mm) embedment and 2-inch (50-mm) hook, not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c., unless otherwise indicated.

## 2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
  1. Furnish inserts for units installed after concrete is placed.
- C. Fabricate supports for operable partitions from continuous steel beams of sizes recommended by partition manufacturer with attached bearing plates, anchors, and braces as recommended by partition manufacturer. Drill or punch bottom flanges of beams to receive partition track hanger rods; locate holes where indicated on operable partition Shop Drawings.
- D. Prime miscellaneous framing and supports with zinc-rich primer where indicated.

## 2.7 METAL LADDERS

- A. General:
  1. Comply with ANSI A14.3, except for elevator pit ladders.
  2. For elevator pit ladders, comply with ASME A17.1/CSA B44.
- B. Steel Ladders:
  1. Space siderails 16 inches (406 mm) apart unless otherwise indicated.
  2. Siderails: Continuous, 3/8-by-2-1/2-inch (9.5-by-64-mm) steel flat bars, with eased edges.
  3. Rungs: 3/4-inch- (19-mm-) diameter steel bars.
  4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
  5. Provide nonslip surfaces on top of each rung by coating with abrasive material metallurgically bonded to rung.
  6. Support each ladder at top and bottom and not more than 60 inches (1500 mm) o.c. with welded or bolted steel brackets.
  7. Prime exterior ladders, including brackets and fasteners, with zinc-rich primer.

## 2.8 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.
- C. Finish exposed surfaces to remove tool and die marks and stretch lines, and to blend into surrounding surface.

## 2.9 STEEL AND IRON FINISHES

- A. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction. Provide threaded fasteners for use with concrete and masonry inserts, toggle bolts, through bolts, lag screws, wood screws, and other connectors.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- D. Corrosion Protection: Coat concealed surfaces of aluminum that will come into contact with grout, concrete, masonry, wood, or dissimilar metals with the bituminous paint.

### 3.2 INSTALLING MISCELLANEOUS FRAMING AND SUPPORTS

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

### 3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.
- B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 9 painting Sections.

END OF SECTION 05 50 00

SECTION 05 51 13

METAL PAN STAIRS

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. Preassembled steel stairs with concrete-filled treads.
2. Steel tube railings attached to metal stairs.
3. Steel tube handrails attached to walls adjacent to metal stairs.
4. Railing gates at the level of exit discharge.

B. Related Sections:

1. Section 03 30 00 "Cast-in-Place Concrete" for concrete fill for stair treads and platforms.
2. Section 06 10 53 "Miscellaneous Rough Carpentry" for wood blocking for anchoring railings.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

- B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to  $L/240$  or 1/4 inch (6.4 mm), whichever is less.

- C. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated.

1. Handrails and Top Rails of Guards:

- a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
- b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
- c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

- a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).

- b. Infill load and other loads need not be assumed to act concurrently.
- D. Seismic Performance: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
  - 1. Component Importance Factor is 1.5.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For metal stairs and the following:
  - 1. Paint products.
  - 2. Grout.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- D. Samples for Initial Selection: For products involving selection of color, texture, or design.
- E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Fabricator of products.
- B. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," for class of stair designated, unless more stringent requirements are indicated.
  - 1. Ornamental Stairs: Architectural class.
- C. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.3, "Structural Welding Code - Sheet Steel."

## 1.7 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for metal stairs. 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 locations of hanger rods and struts with other work so that they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

## PART 2 - PRODUCTS

### 2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent

### 2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- C. Uncoated, Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, structural steel, Grade 25 (Grade 170), unless another grade is required by design loads; exposed.
- D. Perforated Metal: Cold-rolled steel sheet, ASTM A 1008/A 1008M, or hot-rolled steel sheet, ASTM A 1011/A 1011M, commercial steel Type B.
  - 1. Perforations: Horizontal 1.5 inch by 1.25 inch openings, 40% open, in staggered rows and as indicated.
  - 2. Thickness: 0.0598 inches, 16 gage.
  - 3. Finish: As indicated.

### 2.3 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 12 for exterior use, and Class Fe/Zn 5 where built into exterior walls. Select fasteners for type, grade, and class required.

### 2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Shop Primers: Provide primers that comply with Section 09 91 00 "Painting."

- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- D. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- E. Concrete Materials and Properties: Comply with requirements in Section 03 30 00 "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa) unless otherwise indicated.
- F. Welded Wire Fabric: ASTM A 185/A 185M, 6 by 6 inches (152 by 152 mm), W1.4 by W1.4, unless otherwise indicated.

## 2.5 FABRICATION, GENERAL

- A. Provide complete stair assemblies, including metal framing, hangers, struts, [railings,] clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
  - 1. Join components by welding unless otherwise indicated.
  - 2. Use connections that maintain structural value of joined pieces.
- B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- E. Form exposed work with accurate angles and surfaces and straight edges.
- F. Weld connections to comply with the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. Weld exposed corners and seams continuously unless otherwise indicated.
  - 5. At exposed connections, finish exposed welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.
- G. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Where exposed fasteners are required, use Phillips flat-head (countersunk) screws or bolts unless otherwise indicated. Locate joints where least conspicuous.

## 2.6 STEEL-FRAMED STAIRS

- A. Stair Framing: Fabricate stairs of steel shapes and fully welded as indicated on Drawings.
  - 1. Where stairs are enclosed by gypsum board assemblies, provide hanger rods or struts to support landings from floor construction above or below. Locate hanger rods and struts where they will not encroach on required stair width and will be within the fire-resistance-rated stair enclosure.

2. Where concrete walls support metal stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
- B. Metal-Pan Stairs: Form risers, subtread pans, and subplatforms to configurations shown from steel sheet of thickness needed to comply with performance requirements but not less than 0.067 inch (1.7 mm).
1. Steel Sheet: Uncoated cold-rolled steel sheet.
  2. Directly weld metal pans to stringers; locate welds on top of subtreads where they will be concealed by concrete fill. Do not weld risers to stringers.
  3. Shape metal pans to include nosing integral with riser.
  4. At Contractor's option, provide stair assemblies with metal-pan subtreads filled with reinforced concrete during fabrication.
  5. Provide subplatforms of configuration indicated or, if not indicated, the same as subtreads. Weld subplatforms to platform framing.
    - a. Smooth Soffit Construction: Construct subplatforms with flat metal under surfaces to produce smooth soffits.

## 2.7 STAIR RAILINGS

- A. General: Connect posts to stair framing by direct welding unless otherwise indicated.
- B. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.
1. Gates: Form gates from steel tube of same size and shape as top rails, with infill to match guards. Provide with cam-type, self-closing or spring hinges for fastening to wall and overlapping stop with rubber bumper to prevent gate from opening in direction opposite egress.
- C. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 1 welds: no evidence of a welded joint.
- D. Form changes in direction of railings as follows:
1. As detailed.
  2. By radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.
- E. Form simple and compound curves by bending members in jigs to produce uniform curvature for each repetitive configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- F. Close exposed ends of railing members with prefabricated end fittings.
- G. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch (6 mm) or less.
- H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work. Furnish inserts and other anchorage devices for connecting to concrete or masonry work.
1. Connect posts to stair framing by direct welding unless otherwise indicated.

- I. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses and to produce adequate bearing area to prevent bracket rotation and overstressing of substrate.

## 2.8 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal stairs after assembly.
- C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- D. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.
- B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.
- C. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.
- D. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- E. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- F. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.
- G. Place and finish concrete fill for treads and platforms to comply with Section 03 30 00 "Cast-in-Place Concrete."

### 3.2 INSTALLING RAILINGS

- A. Adjust railing systems before anchoring to ensure matching alignment at abutting joints. Space posts at spacing indicated or, if not indicated, as required by design loads. Plumb posts in each direction. Secure posts and rail ends to building construction as indicated.

- B. Attach handrails to wall with wall brackets. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt. Provide bracket with 1-1/2-inch (38-mm) clearance from inside face of handrail and finished wall surface. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as required to comply with performance requirements.

### 3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

END OF SECTION 05 51 13

SECTION 05 51 33

INCLINED METAL LADDERS

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: Aluminum Ships Ladders..

1.3 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written instructions to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorages for ships ladders. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

1.4 ACTION SUBMITTALS

- A. Product Data: For ships ladders.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Store ladder until installation inside under cover. If stored outside, under a tarp or suitable cover.

1.6 WARRANTY

- A. Limited Warranty: Provide one year warranty against defective material and workmanship.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis of Design: Precision Ladders, LLC, Morristown, TN 37816-2279; Toll Free Tel: 800-225-7814; Tel: 423-586-2265; Fax: 423-586-2091; Web: [www.PrecisionLadders.com](http://www.PrecisionLadders.com). Subject to compliance with requirements and Architect approval, other comparable products may be incorporated into the Work.

1. Model: Model SL Aluminum Ships Ladder as manufactured by Precision Ladders, LLC.

### 2.2 ALUMINUM SHIPS LADDER

- A. Aluminum Ships Ladder and Components: Ladder, mounting brackets and handrails on both sides.

1. Capacity: Unit shall support a 500 lb (227 kg) total load without failure.
2. Ladder Stringer: 5 inch by 2 inch by 3/16 inch (127 mm by 51 mm by 5 mm) extruded 6005-T5 aluminum channel. Pitch: 60 to 75 degrees.
3. Ladder Mounting Brackets:
  - a. Floor Bracket: 2 inch by 3 inch by 1/4 inch (51 mm by 76 mm by 6 mm) aluminum angle.
  - b. Top Bracket: 4-3/4 inch by 5 inch by 1/4 inch (121 mm by 127 mm by 6 mm) aluminum angle.
4. Handrails: 1-1/4 inches (32 mm) Schedule 40, 6005-T5 aluminum pipe provided with internal aluminum fittings.

### 2.3 METALS

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

### 2.4 FABRICATION, GENERAL

- A. Provide complete ladder assemblies, including metal framing, hangers, clips, brackets, bearing plates, and other components necessary to support and anchor ladders on supporting structure.
- B. Completely fabricate ladder ready for installation before shipment to the site.
- C. Completely fabricate handrail components ready for field assembly to ladder before shipment to site.

### 2.5 FINISHES

- A. Finish: Mill finish on aluminum components.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates. Notify Architect of unsatisfactory preparation before proceeding.
- B. Examine materials upon arrival at site. Notify the carrier and manufacturer of any damage.

3.2 INSTALLATION, GENERAL

- A. Install in accordance with manufacturer's instructions.

3.3 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION 05 51 33

SECTION 05 52 13

PIPE AND TUBE RAILINGS

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. Steel pipe and tube railings.

B. Related Sections:

- 1. Section 05 51 00 "Metal Stairs" for steel tube railings associated with metal stairs.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design railings, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

- B. General: In engineering railings to withstand structural loads indicated, determine allowable design working stresses of railing materials based on the following:

- 1. Steel: 72 percent of minimum yield strength.

- C. Structural Performance: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

- 1. Handrails and Top Rails of Guards:

- a. Uniform load of 50 lbf/ ft. (0.73 kN/m) applied in any direction.
- b. Concentrated load of 200 lbf (0.89 kN) applied in any direction.
- c. Uniform and concentrated loads need not be assumed to act concurrently.

- 2. Infill of Guards:

- a. Concentrated load of 50 lbf (0.22 kN) applied horizontally on an area of 1 sq. ft. (0.093 sq. m).
- b. Infill load and other loads need not be assumed to act concurrently.

- D. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.

- 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

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

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Manufacturer's product lines of mechanically connected railings.
  - 2. Railing brackets.
  - 3. Grout, anchoring cement, and paint products.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
- D. Samples: For products involving selection of color, texture, or design.
- E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

#### 1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."

#### 1.7 PROJECT CONDITIONS

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

#### 1.8 COORDINATION AND SCHEDULING

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' written recommendations to ensure that shop primers and topcoats are compatible with one another.

- B. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- C. Schedule installation so wall attachments are made only to completed walls. Do not support railings temporarily by any means that do not satisfy structural performance requirements.

## PART 2 - PRODUCTS

### 2.1 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

### 2.2 STEEL AND IRON

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
- C. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.
- D. Plates, Shapes, and Bars: ASTM A 36/A 36M.

### 2.3 FASTENERS

- A. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 for zinc coating.
- B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.

### 2.4 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- C. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.
- D. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.

## 2.5 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the 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. Use connections that maintain structural value of joined pieces.
- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Connections: Fabricate railings with welded connections unless otherwise indicated.
- F. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove flux immediately.
  - 4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.
- G. Form changes in direction as follows:
  - 1. As detailed.
  - 2. By radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.
- H. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- I. Close exposed ends of railing members with prefabricated end fittings.
- J. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns.
- K. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
- L. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

## 2.6 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.

- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.7 STEEL AND IRON FINISHES

- A. For nongalvanized steel railings, provide nongalvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors to be embedded in exterior concrete or masonry.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- C. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
- D. High-Performance Coating: Apply epoxy intermediate and polyurethane topcoats to prime-coated surfaces. Comply with coating manufacturer's written instructions and with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Apply at spreading rates recommended by coating manufacturer.
  - 1. Color: Match Architect's sample.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).
  - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (5 mm in 3 m).
- C. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- D. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

### 3.2 RAILING CONNECTIONS

- A. Welded Connections: Use fully welded joints for permanently connecting railing components. Comply with requirements for welded connections in "Fabrication" Article whether welding is performed in the shop or in the field.

3.3 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.

- 1. Apply by brush or spray to provide a minimum 2.0-mil (0.05-mm) dry film thickness.

3.4 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.

END OF SECTION 05 52 13

SECTION 05 73 00

DECORATIVE METAL RAILINGS

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. Stainless steel decorative railings with glass infill.
- B. Related Sections:
  - 1. Division 05 Section "Metal Pan Stairs" for steel tube railings included with metal stairs.
  - 2. Division 05 Section "Pipe and Tube Railings" for railings fabricated from pipe and tube components.

1.3 DEFINITIONS

- A. Railings: Guards, handrails, and similar devices used for protection of occupants at open-sided floor areas, pedestrian guidance and support, visual separation, or wall protection.

1.4 SUBMITTALS

- A. Product Data: For the following:
  - 1. Manufacturer's product lines of railings assembled from standard components.
  - 2. Grout, anchoring cement, and paint products.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
  - 1. For illuminated railings, include wiring diagrams and roughing-in details.
- D. Samples for Verification: For each type of exposed finish required.
  - 1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
  - 2. Each type of glass required.
  - 3. Fittings and brackets.
  - 4. Welded connections.

5. Assembled Samples of railing systems, made from full-size components, including top rail, post, handrail, and infill. Show method of finishing members at intersections. Samples need not be full height.

## 1.5 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of railing from single source from single manufacturer.
- B. Product Options: Information on Drawings and in Specifications establishes requirements for system's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including structural analysis, preconstruction testing, field testing, and in-service performance.
  1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- C. Product Options: Drawings indicate size, profiles, and dimensional requirements of railings and are based on the specific system indicated. Refer to Division 01 Section "Product Requirements."
  1. Do not modify intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If modifications are proposed, submit comprehensive explanatory data to Architect for review.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
  1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."
  2. AWS D1.2/D1.2M, "Structural Welding Code - Aluminum."
  3. AWS D1.6, "Structural Welding Code - Stainless Steel."
- E. Safety Glazing Labeling: Permanently mark glass with certification label of manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
  1. Build mockups as shown on Drawings.
  2. Build mockups for each form and finish of railing consisting of two posts, top rail, infill area, and anchorage system components that are full height and are not less than 24 inches(600 mm) in length.
  3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.6 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of walls and other construction contiguous with railings by field measurements before fabrication and indicate measurements on Shop Drawings.

## 1.7 COORDINATION AND SCHEDULING

- A. Coordinate installation of anchorages for railings. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

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

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Aluminum Decorative Railings:
    - a. Architectural Metal Works.
    - b. Blumcraft of Pittsburgh.
    - c. Braun, J. G., Company; a division of the Wagner Companies.
    - d. Laurence, C. R. Co., Inc.

### 2.2 METALS, GENERAL

- A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.
- B. Brackets, Flanges, and Anchors: Same metal and finish as supported rails unless otherwise indicated.
  - 1. Provide cast-metal brackets with flange tapped for concealed anchorage to threaded hanger bolt.
  - 2. Provide either formed- or cast-metal brackets with predrilled hole for exposed bolt anchorage.
  - 3. Provide extruded-aluminum brackets with interlocking pieces that conceal anchorage. Locate set screws on bottom of bracket.

### 2.3 STAINLESS STEEL

- A. Tubing: ASTM A 554, Grade MT 304.
- B. Pipe: ASTM A 312/A 312M, Grade TP 304.
- C. Sheet, Strip, Plate, and Flat Bar: ASTM A 666, Type 304.
- D. Bars and Shapes: ASTM A 276, Type 304.

### 2.4 GLASS AND GLAZING MATERIALS

- A. Tempered Glass: ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated), Type 1 (transparent flat glass), Quality-Q3. Provide products that have been tested for surface and edge compression according to ASTM C 1048 and for impact strength according to 16 CFR 1201 for Category II materials.
  - 1. Glass Color: Clear.
  - 2. Thickness for Glass Infill Panels: As required by structural loads, but not less than 6.0 mm.
- B. Glazing Cement and Accessories for Structural Glazing: Glazing cement, setting blocks, shims, and related accessories as recommended or supplied by railing manufacturer for installing structural glazing in metal subrails.
  - 1. Glazing Cement: Nonshrinking organic cement designed for curing by passing an electric current through metal subrail holding glass panel, as standard with manufacturer.

- C. Glazing Gaskets for Glass Infill Panels: Glazing gaskets and related accessories recommended or supplied by railing manufacturer for installing glass infill panels in post-supported railings.

## 2.5 FASTENERS

- A. Fastener Materials: Unless otherwise indicated, provide the following:
  - 1. Aluminum Components: Type 304 stainless-steel fasteners.
  - 2. Uncoated Steel Components: Plated-steel fasteners complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating where concealed; Type 304 stainless-steel fasteners where exposed.
  - 3. Dissimilar Metals: Type 304 stainless-steel fasteners.
- B. Fasteners for Anchoring to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
- C. Provide concealed fasteners for interconnecting railing components and for attaching railings to other work unless otherwise indicated.
  - 1. Provide Phillips flat-head machine screws for exposed fasteners unless otherwise indicated.
- D. Anchors, General: Anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- E. Post-Installed Anchors: Torque-controlled expansion anchors.
  - 1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941(ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.

## 2.6 MISCELLANEOUS MATERIALS

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
  - 1. For aluminum railings, provide type and alloy as recommended by producer of metal to be welded and as required for color match, strength, and compatibility in fabricated items.
- B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
- C. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- D. Anchoring Cement: Factory-packaged, nonshrinking, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

## 2.7 FABRICATION

- A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.
- B. Assemble railings in the 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. Use connections that maintain structural value of joined pieces.

- C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch(1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.
- D. Form work true to line and level with accurate angles and surfaces.
- E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate. Locate weep holes in inconspicuous locations.
- F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.
- G. Connections: Fabricate railings with welded connections unless otherwise indicated.
- H. Welded Connections for Aluminum Pipe: Fabricate railings to interconnect members with concealed internal welds that eliminate surface grinding, using manufacturer's standard system of sleeve and socket fittings.
- I. Form changes in direction as follows:
  - 1. By bending or by inserting prefabricated elbow fittings.
- J. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.
- K. Close exposed ends of hollow railing members with prefabricated end fittings.
- L. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns, unless clearance between end of rail and wall is 1/4 inch(6 mm) or less.

## 2.8 GLAZING PANEL FABRICATION

- A. General: Fabricate to sizes and shapes required; provide for proper edge clearance and bite on glazing panels.
  - 1. Clean-cut or flat-grind edges at butt-glazed sealant joints to produce square edges with slight chamfers at junctions of edges and faces
  - 2. Grind smooth exposed edges, including those at open joints, to produce square edges with slight chamfers at junctions of edges and faces.
- B. Infill Panels: Provide tempered glass panels.

## 2.9 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipment.
- C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine plaster and gypsum board assemblies, where reinforced to receive anchors, to verify that locations of concealed reinforcements have been clearly marked for Installer. Locate reinforcements and mark locations if not already done.

### 3.2 INSTALLATION, GENERAL

- A. Fit exposed connections together to form tight, hairline joints.
- B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.
  - 1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
  - 2. Set posts plumb within a tolerance of 1/16 inch in 3 feet(2 mm in 1 m).
  - 3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet(5 mm in 3 m).
- C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.
- D. Adjust railings before anchoring to ensure matching alignment at abutting joints.
- E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

### 3.3 RAILING CONNECTIONS

- A. Nonwelded Connections: Use mechanical or adhesive joints for permanently connecting railing components. Use wood blocks and padding to prevent damage to railing members and fittings. Seal recessed holes of exposed locking screws using plastic cement filler colored to match finish of railings.

### 3.4 INSTALLING GLASS PANELS

- A. Post-Supported Glass Railings: Install assembly to comply with railing manufacturer's written instructions and with requirements in other Part 3 articles. Erect posts and other metal railing components, then set factory-cut glass panels. Do not cut, drill, or alter glass panels in field. Protect edges from damage.

### 3.5 CLEANING

- A. Clean aluminum and stainless steel by washing thoroughly with clean water and soap, rinsing with clean water, and wiping dry.
- B. Clean and polish glass as recommended in writing by manufacturer. Wash both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion.

3.6 PROTECTION

- A. Protect finishes of railings from damage during construction period with temporary protective coverings approved by railing manufacturer. Remove protective coverings at time of Substantial Completion.
- B. Restore finishes damaged during installation and construction period so no evidence remains of correction work. Return items that cannot be refinished in the field to the shop; make required alterations and refinish entire unit, or provide new units.

END OF SECTION 05 73 00

SECTION 06 10 53

MISCELLANEOUS ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Wood blocking and nailers.
  - 2. Plywood backing panels.

1.3 DEFINITIONS

- A. Dimension Lumber: Lumber of 2 inches nominal (38 mm actual) or greater but less than 5 inches nominal (114 mm actual) in least dimension.
- B. Lumber grading agencies, and the abbreviations used to reference them, include the following:
  - 1. NHLA: National Hardwood Lumber Association.
  - 2. WCLIB: West Coast Lumber Inspection Bureau.
  - 3. WWPA: Western Wood Products Association.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
  - 2. Include data for fire-retardant treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Include physical properties of treated materials based on testing by a qualified independent testing agency.
  - 3. For fire-retardant treatments, include physical properties of treated lumber both before and after exposure to elevated temperatures, based on testing by a qualified independent testing agency according to ASTM D 5664.
  - 4. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
  - 5. Include copies of warranties from chemical treatment manufacturers for each type of treatment.
- B. LEED Submittals:
  - 1. Certificates for Credit MR 6 and Credit MR 7: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.

2. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
3. Product Data for Credit IEQ 4.4: For composite wood products, documentation indicating that product contains no urea formaldehyde.

#### 1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

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

### PART 2 - PRODUCTS

#### 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  1. Factory mark each piece of lumber with grade stamp of grading agency.
  2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece.
  3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
  4. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Maximum Moisture Content of Lumber: 15 percent unless otherwise indicated.

#### 2.2 WOOD-PRESERVATIVE-TREATED MATERIALS

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

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

1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
2. Wood sills, sleepers, blocking, and similar concealed members in contact with masonry or concrete.
3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
4. Wood framing members that are less than 18 inches (460 mm) above the ground in crawl spaces or unexcavated areas.
5. Wood floor plates that are installed over concrete slabs-on-grade.

### 2.3 FIRE-RETARDANT-TREATED MATERIALS

- A. General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
- B. Fire-Retardant-Treated Lumber and Plywood by Pressure Process: Products with a flame spread index of 25 or less when tested according to ASTM E 84, and with no evidence of significant progressive combustion when the test is extended an additional 20 minutes, and with the flame front not extending more than 10.5 feet (3.2 m) beyond the centerline of the burners at any time during the test.
1. Use treatment that does not promote corrosion of metal fasteners.
  2. Exterior Type: Treated materials shall comply with requirements specified above for fire-retardant-treated lumber and plywood by pressure process after being subjected to accelerated weathering according to ASTM D 2898. Use for exterior locations and where indicated.
  3. Interior Type A: Treated materials shall have a moisture content of 28 percent or less when tested according to ASTM D 3201 at 92 percent relative humidity. Use where exterior type is not indicated.
  4. Design Value Adjustment Factors: Treated lumber shall be tested according ASTM D 5664, and design value adjustment factors shall be calculated according to ASTM D 6841.
- C. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Kiln-dry plywood after treatment to a maximum moisture content of 15 percent.
- D. Identify fire-retardant-treated wood with appropriate classification marking of testing and inspecting agency acceptable to authorities having jurisdiction.
1. For exposed lumber indicated to receive a stained or natural finish, mark end or back of each piece.
- E. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not bleed through, contain colorants, or otherwise adversely affect finishes.
- F. Application: Treat all miscellaneous carpentry unless otherwise indicated.

### 2.4 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
  2. Nailers.
  3. Cants.

- B. For items of dimension lumber size, provide Construction or No. 2 grade lumber of any species.
- C. For concealed boards, provide lumber with 15 percent maximum moisture content and the following species and grades:
  - 1. Western woods, Construction or No. 2 Common grade; WCLIB or WWP.
- D. For blocking not used for attachment of other construction, Utility, Stud, or No. 3 grade lumber of any species may be used provided that it is cut and selected to eliminate defects that will interfere with its attachment and purpose.
- E. For blocking and nailers used for attachment of other construction, select and cut lumber to eliminate knots and other defects that will interfere with attachment of other work.

## 2.5 PLYWOOD BACKING PANELS

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

## 2.6 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. Where carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Power-Driven Fasteners: NES NER-272.
- C. Wood Screws: ASME B18.6.1.
- D. Screws for Fastening to Metal Framing: ASTM C 1002, length as recommended by screw manufacturer for material being fastened.
- E. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry assemblies and equal to 4 times the load imposed when installed in concrete as determined by testing per ASTM E 488 conducted by a qualified independent testing and inspecting agency.
  - 1. Material: Carbon-steel components, zinc plated to comply with ASTM B 633, Class Fe/Zn 5.
  - 2. Material: Stainless steel with bolts and nuts complying with ASTM F 593 and ASTM F 594, Alloy Group 1 or 2 (ASTM F 738M and ASTM F 836M, Grade A1 or A4).

## 2.7 MISCELLANEOUS MATERIALS

- A. Flexible Flashing: Composite, self-adhesive, flashing product consisting of a pliable, butyl rubber or rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- B. Framing Standard: Comply with AF&PA's WCD 1, "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Install plywood backing panels by fastening to studs; coordinate locations with utilities requiring backing panels.
- D. Do not splice structural members between supports unless otherwise indicated.
- E. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
  - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches (406 mm) o.c.
- F. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- G. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  - 1. Use inorganic boron for items that are continuously protected from liquid water.
  - 2. Use copper naphthenate for items not continuously protected from liquid water.
- H. Securely attach carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. NES NER-272 for power-driven fasteners.
  - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.
  - 3. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.

### 3.2 PROTECTION

- A. Protect miscellaneous rough carpentry from weather. If, despite protection, miscellaneous rough carpentry becomes wet, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 10 53

SECTION 06 40 23

INTERIOR ARCHITECTURAL WOODWORK

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. Plastic-laminate cabinets.
  - 2. Plastic-laminate countertops.
  - 3. Solid-surfacing-material countertops.
  - 4. Closet and utility shelving.
  - 5. Stainless steel millwork base.
  - 6. Transaction front lightbox.
  - 7. Cabinet Hardware and accessories.

1.3 DEFINITIONS

- A. Interior architectural woodwork includes wood furring, blocking, shims, and hanging strips for installing woodwork items unless concealed within other construction before woodwork installation.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated, including cabinet hardware and accessories.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
  - 2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
  - 3. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regionally manufactured and regionally extracted and manufactured materials. Include statement indicating cost for each regionally manufactured material.
    - a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
    - b. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.

4. Certificates for Credit MR 6 and Credit MR 7: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification and chain-of-custody requirements. Include statement indicating cost for each certified wood product.
  5. Product Data for Credit IEQ 4.4: For adhesives and composite wood products, documentation indicating that products contain no urea formaldehyde.
- C. Product Data: For high-pressure decorative laminate, solid-surfacing material, cabinet hardware and accessories.
  - D. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
    1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
    2. Show locations and sizes of cutouts and holes for plumbing fixtures and other items installed in architectural woodwork.
  - E. Samples for Initial Selection:
    1. Plastic laminates.
    2. Solid-surfacing materials.
    3. Stainless steel base.
  - F. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
  - G. Qualification Data: For Installer.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Certified participant in AWI's Quality Certification Program.
- B. Source Limitations: Engage a qualified woodworking firm to assume undivided responsibility for production of interior architectural woodwork with sequence-matched wood veneers.
- C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork indicated for construction, finishes, installation, and other requirements.
- D. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver woodwork until painting and similar operations that could damage woodwork have been completed in installation areas. If woodwork must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Project Conditions" Article.

## 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Environmental Limitations: Do not deliver or install woodwork until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during the remainder of the construction period.
- C. Field Measurements: Where woodwork is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support woodwork by field measurements before being enclosed, and indicate measurements on Shop Drawings.
  - 2. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating woodwork without field measurements. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

## 1.8 COORDINATION

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

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. General: Provide materials that comply with requirements of AWI's quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Regional Materials: Plastic-laminate cabinets shall be manufactured within 500 miles (800 km) of Project site.
- C. Certified Wood: Plastic-laminate cabinets shall be made from wood products certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
- D. Wood Products: Comply with the following:
  - 1. Hardboard: AHA A135.4.
  - 2. Medium-Density Fiberboard: ANSI A208.2, Grade MD.
  - 3. Particleboard: ANSI A208.1, Grade M-2.
  - 4. Softwood Plywood: DOC PS 1.
  - 5. Veneer-Faced Panel Products (Hardwood Plywood): HPVA HP-1.
- E. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
- F. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated or, if not indicated, as required by woodwork quality standard.

G. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with ISSFA-2.

1. Colors and Patterns: As selected by Architect from manufacturer's full range.

## 2.2 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 08 Section "Door Hardware."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening, self-closing.

1. NAU Standard: "Amerock," spring loaded.

C. Wire Pulls: Back mounted, solid metal, 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter.

D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04102; with shelf brackets, B04112.

E. Drawer Slides: BHMA A156.9, B05091.

1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.

2. Box Drawer Slides: Grade 1HD-100; for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.

3. File Drawer Slides: Grade 1HD-200; for drawers more than 6 inches (150 mm) high or 24 inches (600 mm) wide.

4. Pencil Drawer Slides: Grade 1; for drawers not more than 3 inches (75 mm) high and 24 inches (600 mm) wide.

5. Keyboard Slides: Grade 1; for computer keyboard shelves.

F. Grommets for Cable Passage through Countertops: 2-1/2 inch OD,, molded-plastic grommets and matching plastic caps with slot for wire passage, color as selected by Architect.

G. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Stainless Steel: BHMA 630.

H. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

I. Standoffs: Solid stainless steel standoffs, 3/4 inch diameter by 1 inch as manufactured by TAP Plastics or comparable product approved by Architect.

1. Shall accommodate panels up to 1/2 inch thick.

## 2.3 RESIN INFUSED COMPOSITE PANELS

A. Basis of Design: Composite panels manufactured by TorZo Surfaces. Products of other manufacturers will be considered subject to compliance with requirements and approval of Architect.

B. Physical characteristics:

1. Recycled content: 75 percent pre-consumer recycled FSC-certified wood.

2. Free from added urea formaldehyde.

3. Color: As selected by Architect from manufacturer's full color range.

4. Thickness: As indicated, tested to ASTM D1037.
5. Density: 72, tested to ASTM D2395.
6. Internal bond: 498, tested to ASTM D1037.
7. Modulus of rupture: 8823, tested to ASTM D1037.
8. Modulus of elasticity: 1,281,514, tested to ASTM D1037.
9. Hardness, Janka ball: 4589, tested to ASTM D1037.
10. Screw holding; tested to ASTM D1037:
  - a. Face: 751.
  - b. Edge: 729.
11. Linear expansion: 0.07, tested to ASTM D1037.
12. Moisture content: 2.0, tested to ASTM D4442.
13. Fire rating: Class C, tested to ASTM E84.

#### 2.4 STAINLESS STEEL BASE

- A. Stainless Steel Base: Molding No. 4 satin polish, 22 gage, 0.030 inches thick straight base, as distributed by Elite Xpressions or comparable product acceptable to Architect.
  1. Lengths: 10 ft. or greater.
  2. Miter cut corners on job site.

#### 2.5 TRANSACTION FRONT LIGHTBOX

- A. Lightbox Basis of Design: Drawings are based on "Inset Transaction Front Lightbox," as manufactured by 3-Form. Information on Drawings and in Specifications establishes requirements for product's aesthetic effects and performance characteristics. Products by other manufacturers will be considered but are subject to Architect approval and compliance with requirements.
- B. Lightbox consists of a factory fabricated illuminated box with translucent face panel. Lightbox shall be installed in the millwork as indicated.
  1. Face: "Varia Ecoresin," color and pattern as selected from manufacturer's full range.
  2. Light diffusion: Layer of "Ghost."
  3. Face mounted with access to lighting.
  4. Provide LED lighting and reflective interior of lightbox.

#### 2.6 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide nonferrous-metal or hot-dip galvanized anchors and inserts on inside face of exterior walls and elsewhere as required for corrosion resistance. Provide toothed-steel or lead expansion sleeves for drilled-in-place anchors.
- C. Adhesive for Bonding Plastic Laminate: Contact cement.
  1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

## 2.7 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Unless otherwise indicated, provide Custom-grade interior woodwork complying with referenced quality standard.
- B. Wood Moisture Content: Comply with requirements of referenced quality standard for wood moisture content in relation to ambient relative humidity during fabrication and in installation areas.
- C. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
  - 1. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members 3/4 Inch (19 mm) Thick or Less: 1/16 inch (1.5 mm).
  - 2. Edges of Rails and Similar Members More Than 3/4 Inch (19 mm) Thick: 1/8 inch (3 mm).
  - 3. Corners of Cabinets and Edges of Solid-Wood (Lumber) Members and Rails: 1/16 inch (1.5 mm).
- D. Complete fabrication, including assembly and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
  - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements indicated on Shop Drawings before disassembling for shipment.
- E. Shop-cut openings to maximum extent possible to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
  - 1. Seal edges of openings in countertops with a coat of varnish.

## 2.8 PLASTIC-LAMINATE CABINETS

- A. AWI Type of Cabinet Construction: Flush overlay.
- B. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
  - 1. Horizontal Surfaces Other Than Tops: Grade HGS.
  - 2. Postformed Surfaces: Grade HGP.
  - 3. Vertical Surfaces: Grade HGS.
  - 4. Edges: Grade HGS.
- C. Materials for Semiexposed Surfaces:
  - 1. Surfaces Other Than Drawer Bodies: High-pressure decorative laminate, Grade VGS.
    - a. Edges of Plastic-Laminate Shelves: Same as laminate cladding on horizontal surfaces.
    - b. For semiexposed backs of panels with exposed plastic-laminate surfaces, provide surface of high-pressure decorative laminate, Grade VGS.
  - 2. Drawer Sides and Backs: Solid-hardwood lumber.
  - 3. Drawer Bottoms: Hardwood plywood.
- D. Concealed Backs of Panels with Exposed Plastic Laminate Surfaces: High-pressure decorative laminate, Grade BKL.

- E. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
  - 1. As indicated by laminate manufacturer's designations.
  - 2. Match Architect's sample.
  - 3. As selected by Architect from laminate manufacturer's full range.

## 2.9 PLASTIC-LAMINATE COUNTERTOPS

- A. High-Pressure Decorative Laminate Grade: HGS.
- B. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed laminate surfaces complying with the following requirements:
  - 1. As indicated by manufacturer's designations.
  - 2. Match Architect's sample.
  - 3. As selected by Architect from manufacturer's full range.
- C. Grain Direction: Parallel to cabinet fronts.
- D. Edge Treatment: Same as laminate cladding on horizontal surfaces.
- E. Core Material: Particleboard.
- F. Core Material at Sinks: Particleboard made with exterior glue.
- G. Backer Sheet: Provide plastic-laminate backer sheet, Grade BKL, on underside of countertop substrate.
- H. Paper Backing: Provide paper backing on underside of countertop substrate.

## 2.10 SIMULATED QUARTZ-SURFACING-MATERIAL COUNTERTOPS

- A. Simulated Quartz: "Silestone," as manufactured by Costentino or comparable product acceptable to Architect.
- B. Solid-Surfacing-Material Thickness: 3/4 inch (19 mm).
- C. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:
  - 1. Match Architect's sample.
- D. Fabricate tops in one piece, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
  - 1. Fabricate tops with shop-applied edges of materials and configuration indicated.
  - 2. Fabricate tops with loose backsplashes for field application.
- E. Install integral sink bowls in countertops in shop.
- F. Drill holes in countertops for plumbing fittings and soap dispensers in shop.

## 2.11 CLOSET AND UTILITY SHELVING

- A. Shelf Material: 3/4-inch (19-mm) solid lumber.

- B. Cleats: 3/4-inch (19-mm) solid lumber.

## PART 3 - EXECUTION

### 3.1 PREPARATION

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

### 3.2 INSTALLATION

- A. Grade: Install woodwork to comply with requirements for the same grade specified in Part 2 for fabrication of type of woodwork involved.
- B. Assemble woodwork and complete fabrication at Project site to comply with requirements for fabrication in Part 2, to extent that it was not completed in the shop.
- C. Install woodwork level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb (including tops) to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- D. Scribe and cut woodwork to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor woodwork to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing as required for complete installation. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork and matching final finish if transparent finish is indicated.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
  - 1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
  - 2. Fasten wall cabinets through back, near top and bottom, at ends and not more than 16 inches (400 mm) o.c.
- G. Countertops: Anchor securely by screwing through corner blocks of base cabinets or other supports into underside of countertop.
  - 1. Align adjacent solid-surfacing-material countertops and form seams to comply with manufacturer's written recommendations using adhesive in color to match countertop. Carefully dress joints smooth, remove surface scratches, and clean entire surface.
  - 2. Install countertops with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
  - 3. Calk space between backsplash and wall with sealant specified in Division 07 Section "Joint Sealants."
- H. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective woodwork, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean woodwork on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

# Casework Alphanumeric Code

Example:  
(wall cabinet  
18"w X 30"h)



1w1830

Casework elevation  
identification

Component height  
Component width

## Typical Casework Component Elevations

### Wall Cabinets

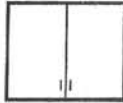
All wall cabinets are 12" deep with two adjustable shelves. (u.n.o.) Top of cabinet to be mounted 84" above floor. (u.n.o.)  
Single door units are right or left hand hinged as appropriate.

1w



One solid  
hinged door

2w



Two solid  
hinged doors

3w



Two solid  
sliding doors

4w



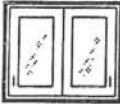
One framed  
glass hinged  
door

5w



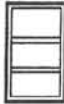
Two framed  
glass hinged  
doors

6w



Two framed  
glass sliding  
doors

7w



Open shelves  
unit

8w



Blind corner  
with one solid  
hinged door

9w



Filler panel,  
width as noted

### Base Cabinets

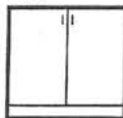
All base cabinets are 24" d with a 4" h toe space. (u.n.o.) Door units (other than sink units) have one adjustable shelf. (u.n.o.)  
Note: cabinet height dimension indicates finish floor to top of counter measurement.

1b



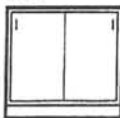
Door unit:  
one hinged door

2b



Door unit:  
two hinged doors

3b



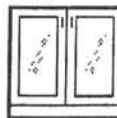
Two solid  
sliding doors

4b



One framed  
glass hinged  
door

5b



Two framed  
glass hinged  
doors

## Base Cabinets (cont.)

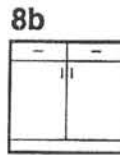
All base cabinets are 24" d with a 4" h toe space. (u.n.o.) Door units (other than sink units) have one adjustable shelf. (u.n.o.)  
 Note: cabinet height dimension indicates finish floor to top of counter measurement.



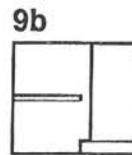
**6b**  
 Door unit:  
 two framed  
 glass sliding  
 doors



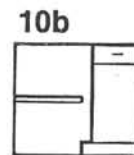
**7b**  
 Drawer/door unit:  
 one 6" drawer,  
 one hinged door



**8b**  
 Drawer/file unit:  
 two 6" drawers,  
 two hinged doors



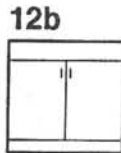
**9b**  
 Blind corner door  
 unit: one hinged  
 door



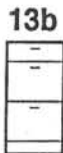
**10b**  
 Blind corner unit:  
 One 6" drawer,  
 one hinged door



**11b**  
 Sink unit:  
 fixed sink front,  
 one hinged door



**12b**  
 Sink unit:  
 fixed sink front,  
 two hinged doors



**13b**  
 Drawer/file unit:  
 one 6" drawer,  
 two file drawers  
 with compressors



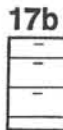
**14b**  
 Drawer/file unit:  
 three 6" drawers,  
 one file drawer  
 with compressor



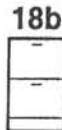
**15b**  
 Drawer unit:  
 One 6" drawer,  
 three equal height  
 drawers below



**16b**  
 Drawer/file unit:  
 two equal height  
 drawers, one file  
 drawer with  
 compressor



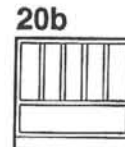
**17b**  
 Drawer unit:  
 one 6" drawer,  
 two equal height  
 drawers below



**18b**  
 File unit:  
 two file drawers  
 with compressors



**19b**  
 Filler panel,  
 width as required



**20b**  
 Dark room tray  
 storage base

## Full Height Cabinets

All full height units are 84" h. (u.n.o.) Open front and combination units have one fixed and four adjustable shelves; all other units contain five adjustable shelves. (u.n.o.)

**1f** (14" deep)

**2f** (24" deep)



One solid  
 hinged door

**3f**



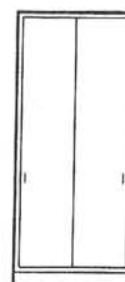
Two solid  
 hinged doors

**4f**



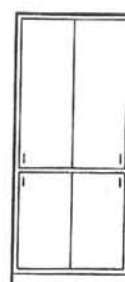
Two solid hinged  
 doors above,  
 two solid hinged  
 doors below

**5f**



Two solid  
 sliding doors

**6f**

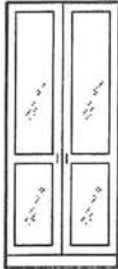


Two solid sliding  
 doors above,  
 two solid sliding  
 doors below

## Full Height Cabinets (cont.)

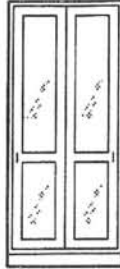
All full height units are 84"h x 16"d.(u.n.o.) Open front and combination units have one fixed and four adjustable shelves; all other units contain five adjustable shelves.(u.n.o.)

**7f**



Two framed glass hinged doors

**8f**



Two framed glass sliding doors

**9f**



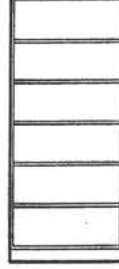
Two framed glass hinged doors above, two framed glass sliding doors below

**10f**



Two framed glass sliding doors above, two framed glass hinged doors below

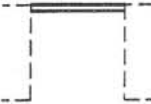
**11f**



Open front

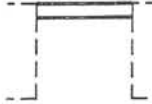
## Accessories

**1a**



Solid knee space panel, 2" high

**2a**



Solid knee space panel, 4 1/2" high

**3a**



Knee space panel with drawer, 4 1/2" high

**4a**



Knee space panel with drawer, 2" high

**5a**



Sink apron panel, 4 1/2" high

**6a**



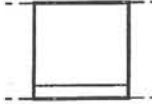
Leg support: 1 1/4"x1 1/4" steel leg with top mounting plate and leveler

**7a**



Panel end: front edge flush with cabinet body edge

**8a**



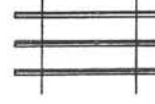
Knee space panel at rear

**9a**



Film bin storage

**10a**



Open shelving on wall mounted brackets

**11a**



Vertical fascia panel above cabinets with returns (width as required)

**12a**



Sloped cabinet top with returns: slope top at 30° (width as required)

**13a**



Bracket support: p. lam. finish over plywood

**14a**



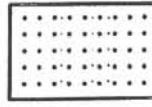
Bracket support: 1/4"x1 1/4" steel frame members

**15a**



Narcotics locker: to be mounted in wall cabinet

**16a**



Glassware pegboard

END OF SECTION 06 40 23

SECTION 06 41 13

WOOD-VENEER-FACED CABINETS

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. Architectural wood cabinets.
- 2. Wood furring, blocking, shims, and hanging strips for installing architectural wood cabinets unless concealed within other construction before cabinet installation.
- 3. Shop finishing of architectural wood cabinets.

B. Related Requirements:

- 1. Section 06 10 00 "Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing cabinets and concealed within other construction before cabinet installation.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product including cabinet hardware and accessories and finishing materials and processes.

B. LEED Submittals:

- 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- 2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
- 3. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regionally manufactured and regionally extracted and manufactured materials. Include statement indicating cost for each regionally manufactured material.
  - a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
  - b. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.

4. Certificates for Credit MR 6 and Credit MR 7: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification and chain-of-custody requirements. Include statement indicating cost for each certified wood product.
  5. Product Data for Credit IEQ 4.4: For adhesives and composite wood products, documentation indicating that products contain no urea formaldehyde.
- C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
1. Show locations and sizes of furring, blocking, and hanging strips, including concealed blocking and reinforcement specified in other Sections.
  2. Show locations and sizes of cutouts and holes for electrical switches and outlets and other items installed in architectural wood cabinets.
  3. Apply AWI Quality Certification Program label to Shop Drawings.
- D. Samples for Initial Selection:
1. Shop-applied transparent finishes.
- E. Samples for Verification:
1. Lumber/veneer for transparent finish, not less than 5 inches (125 mm) wide by 12 inches (300 mm) long, for each species and cut, finished on one side and one edge.
  2. Exposed cabinet hardware and accessories, one unit for each type.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For fabricator.
- B. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.

#### 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Shop that employs skilled workers who custom fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.
- B. Installer Qualifications: Fabricator of products.
- C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  1. Build mockups of architectural wood cabinets as shown on Drawings.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver cabinets until painting and similar operations that could damage woodwork have been completed in installation areas. If cabinets must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

#### 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.

- B. Environmental Limitations: Do not deliver or install cabinets until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 25 and 55 percent during the remainder of the construction period.
- C. Field Measurements: Where cabinets are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support cabinets by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- D. Established Dimensions: Where cabinets are indicated to fit to other construction, establish dimensions for areas where cabinets are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

## 1.9 COORDINATION

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

## PART 2 - PRODUCTS

### 2.1 ARCHITECTURAL WOOD CABINETS, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural wood cabinets indicated for construction, finishes, installation, and other requirements.
  - 1. Provide labels or certificates from AWI certification program indicating that woodwork complies with requirements of grades specified.
- B. Regional Materials: Wood cabinets for transparent finish shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
- C. Regional Materials: Wood cabinets for transparent finish shall be manufactured within 500 miles (800 km) of Project site.
- D. Certified Wood: Wood cabinets for transparent finish shall be produced from wood certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and FSC STD-40-004, "FSC Standard for Chain of Custody Certification."

### 2.2 WOOD CABINETS FOR TRANSPARENT FINISH

- A. Grade: Custom.
- B. Cabinet and Door and Drawer Front Interface Style: Flush Overlay.
- C. Wood for Exposed Surfaces: Birch
  - 1. Species: Select Birch
  - 2. Cut: Rift sawn.
  - 3. Grain Direction: Vertically for doors and fixed panels, horizontally for drawer fronts.
  - 4. Matching of Veneer Leaves: Slip match.

5. Veneer Matching within Panel Face: Balance match.

D. Drawer Construction: Fabricate with exposed fronts fastened to subfront with mounting screws from interior of body.

## 2.3 WOOD MATERIALS

A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.

1. Do not use plain-sawn softwood lumber with exposed, flat surfaces more than 3 inches (75 mm) wide.

## 2.4 CABINET HARDWARE AND ACCESSORIES

A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets, except for items specified in Division 08 Section "Door Hardware."

B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 135 degrees of opening, self-closing.

1. NAU Standard: "Amerock," spring loaded.

C. Wire Pulls: Back mounted, solid metal, 4 inches (100 mm) long, 5/16 inch (8 mm) in diameter.

D. Adjustable Shelf Standards and Supports: BHMA A156.9, B04102; with shelf brackets, B04112.

E. Drawer Slides: BHMA A156.9, B05091.

1. Heavy Duty (Grade 1HD-100 and Grade 1HD-200): Side mounted; full-extension type; zinc-plated steel ball-bearing slides.

2. Box Drawer Slides: Grade 1HD-100; for drawers not more than 6 inches (150 mm) high and 24 inches (600 mm) wide.

3. File Drawer Slides: Grade 1HD-200; for drawers more than 6 inches (150 mm) high or 24 inches (600 mm) wide.

4. Pencil Drawer Slides: Grade 1; for drawers not more than 3 inches (75 mm) high and 24 inches (600 mm) wide.

5. Keyboard Slides: Grade 1; for computer keyboard shelves.

F. Grommets for Cable Passage through Countertops: 2-1/2 inch OD,, molded-plastic grommets and matching plastic caps with slot for wire passage, color as selected by Architect.

G. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.

1. Satin Stainless Steel: BHMA 630.

H. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

I. Coat Hooks: Matt nickel finish, 2-inch projecting coat and hat hook, EPCO No. CH101-ZMN-2 or Architect approved equal.

J. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.

## 2.5 MISCELLANEOUS MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- C. Adhesives: Do not use adhesives that contain urea formaldehyde.

## 2.6 FABRICATION

- A. Fabricate woodwork to dimensions, profiles, and details indicated. Ease edges to radius indicated for the following:
  - 1. Corners of Cabinets: 1/16 inch (1.5 mm) unless otherwise indicated.
- B. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  - 1. Notify Architect seven days in advance of the dates and times woodwork fabrication will be complete.
  - 2. Trial fit assemblies at fabrication shop that cannot be shipped completely assembled. Install dowels, screws, bolted connectors, and other fastening devices that can be removed after trial fitting. Verify that various parts fit as intended and check measurements of assemblies against field measurements before disassembling for shipment.
- C. Shop-cut openings to maximum extent possible to receive hardware, appliances, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.
- D. Install glass to comply with applicable requirements in GANA's "Glazing Manual." For glass in wood frames, secure glass with removable stops.

## 2.7 SHOP FINISHING

- A. General: Finish architectural wood cabinets at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural wood cabinets, as applicable to each unit of work.
  - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of cabinets.
- C. Transparent Finish:
  - 1. Grade: Same as item to be finished.
  - 2. Finish: System - 11, catalyzed polyurethane.
  - 3. Staining: Custom stain color, match sample in Architect's office.
  - 4. Sheen: Semigloss, 46-60 gloss units measured on 60-degree gloss meter per ASTM D 523.

## PART 3 - EXECUTION

### 3.1 PREPARATION

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

### 3.2 INSTALLATION

- A. Grade: Install cabinets to comply with same grade as item to be installed.
- B. Assemble cabinets and complete fabrication at Project site to the extent that it was not completed in the shop.
- C. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm).
- D. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
- E. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails [ or finishing screws ] for exposed fastening, countersunk and filled flush with woodwork.
  - 1. For shop finished items use filler matching finish of items being installed.
- F. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
  - 1. Install cabinets with no more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line.
  - 2. Maintain veneer sequence matching of cabinets with transparent finish.
  - 3. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches (400 mm) o.c.
- G. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.
  - 1. Apply specified finish coats, including stains and paste fillers if any, to exposed surfaces where only sealer/prime coats are applied in shop.

### 3.3 ADJUSTING AND CLEANING

- A. Repair damaged and defective cabinets, where possible, to eliminate functional and visual defects; where not possible to repair, replace woodwork. Adjust joinery for uniform appearance.
- B. Clean, lubricate, and adjust hardware.
- C. Clean cabinets on exposed and semiexposed surfaces. Touch up shop-applied finishes to restore damaged or soiled areas.

END OF SECTION 06 41 13

SECTION 06 42 16

SCULPTED WOOD PANELING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Composite wood paneling.
2. Shop finishing of flush wood paneling.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product, including panel products adhesives finishing materials and processes.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
  - a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
2. Product Data for Credit IEQ 4.1: For installation adhesives, documentation including printed statement of VOC content.
3. Product Data for Credit IEQ 4.4: For composite wood products and fabrication adhesives, documentation indicating that products contain no urea formaldehyde.

C. Shop Drawings: Show location of paneling, large-scale details, attachment devices, and other components. Include dimensioned plans and elevations.

D. Samples: 12 inch by 12inch core material sample with applied finish.

1.3 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install paneling until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.

PART 2 - PRODUCTS

2.1 PANELING FABRICATORS

A. Basis of Design: Drawings are based on the product and manufacturer specified. Information on Drawings and in Specifications establishes requirements for product's aesthetic effects and performance characteristics. Products by other manufacturers will be considered but are subject to Architect approval and compliance with requirements.

1. Product: Textured Panels – Classic Collection, “Scolpito,” with “Glacier White,” 3D laminate finish as manufactured by Soelberg Industries.
2. Fire-rating: UL approved, Class A, fire-rated.
3. Thickness: 19 mm minimum.
4. Pattern: As indicated.
5. Color: As indicated.

## 2.2 SCULPTED WOOD PANELING

- A. Material: FF MDF, using no urea-formaldehyde resin process and 100% recycled or recovered wood material.
  1. Finish: Laminate: Three Dimensional created by utilizing computer controlled machining and thermoforming pressing process.
- B. Assemble panels by concealed fastening, Z clip, point support (stand-offs).
- C. Panel Size: As indicated
- D. Pattern on panels shall fit together in such a way to provide a continuous uninterrupted pattern (Continuous flow pattern).
  1. Pattern direction: Horizontal.
- E. Adhesives: Do not use adhesives that contain urea formaldehyde.

## 2.3 INSTALLATION MATERIALS

- A. Fasteners: Manufacturer recommended Z-clips and stand-offs. Minimum of 6 fasteners per panel.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors.
- C. Construction Mastic: “Liquid Nails,” “PL Premium Polyurethane,” or other mastic recommended by the panel manufacturer.

## 2.4 FABRICATION

- A. Complete fabrication, including assembly and finishing, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
- B. Shop cut openings, to maximum extent possible, to receive hardware, appliances, fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

## 2.5 SHOP FINISHING

- A. General: Finish paneling at fabrication shop as specified in this Section. Manufacturer’s laminate finish.
- B. Backpriming: Apply coat of sealer or primer, compatible with finish coats, to concealed surfaces of paneling.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Before installation, condition paneling to average prevailing humidity conditions in installation areas.

### 3.2 INSTALLATION

- A. Install paneling level, plumb, true, and straight with no distortions. Install with no more than 1/16 inch in 96-inch (1.6 mm in 2400-mm) vertical cup or bow and 1/8 inch in 96-inch (3 mm in 2400-mm) horizontal variation from a true plane.

END OF SECTION 06 42 16

SECTION 06 42 19

DECORATIVE WOOD-CORE PANELING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Plastic-laminate-faced wood paneling (decorative laminate surfacing).
- 2. Wood veneer-faced paneling.
- 3. Wood furring, blocking, shims, and hanging strips for installing plastic-laminate-faced wood paneling unless concealed within other construction before paneling installation.

B. Related Requirements:

- 1. Section 06 10 53 "Miscellaneous Rough Carpentry" for wood furring, blocking, shims, and hanging strips required for installing paneling and that are concealed within other construction before paneling installation.
- 2. Section 06 42 16 "Sculpted Wood Paneling," for 3 dimensionally sculpted wood paneling with laminate finish.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product, including panel products, high-pressure decorative laminate, wood veneers and stains.

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

B. LEED Submittals:

- 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- 2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
- 3. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regionally manufactured materials. Include statement indicating cost for each regionally manufactured material.

- a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
  - 4. Certificates for Credit MR 7: Chain-of-custody certificates indicating that paneling complies with forest certification and chain-of-custody requirements. Include statement indicating cost for each certified wood product.
  - 5. Product Data for Credit IEQ 4.1: For installation adhesives, documentation including printed statement of VOC content.
  - 6. Product Data for Credit IEQ 4.4: For composite wood products and fabrication adhesives, documentation indicating that products contain no urea formaldehyde.
- C. Shop Drawings: Show location of paneling, large-scale details, attachment devices, and other components. Include dimensioned plans and elevations.
- 1. Show details full size.
  - 2. Show locations and sizes of furring and blocking, including concealed blocking specified in other Sections.
- D. Samples verification of wood veneer with applied stain and finish.
- E. Samples for verification for plastic laminates, 12 by 12 inches (300 by 300 mm), for each type, color, pattern, and surface finish, with one sample applied to core material.
- F. Samples of metal clips and reveals, 6 inch long sections for each type.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Woodwork Quality Standard Compliance Certificates: AWI Quality Certification Program certificates.
  - B. Evaluation Reports: For fire-retardant-treated materials, from ICC-ES.
- 1.6 QUALITY ASSURANCE
- A. Fabricator Qualifications: Shop that employs skilled workers who custom-fabricate products similar to those required for this Project and whose products have a record of successful in-service performance. Shop is a certified participant in AWI's Quality Certification Program.
  - B. Testing Agency Qualifications: For testing agency providing classification marking for fire-retardant-treated material, an inspection agency acceptable to authorities having jurisdiction that periodically performs inspections to verify that the material bearing the classification marking is representative of the material tested.
  - C. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
    - 1. Build mockups of typical paneling as shown on Drawings.
    - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Do not deliver paneling until painting and similar operations that could damage paneling have been completed in installation areas. If paneling must be stored in other than installation areas, store only in areas where environmental conditions comply with requirements specified in "Field Conditions" Article.

## 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install paneling until building is enclosed, wet work is complete, and HVAC system is operating and will maintain temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Where paneling is indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support paneling by field measurements before being enclosed and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where paneling is indicated to fit to other construction, establish dimensions for areas where woodwork is to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

## 1.9 COORDINATION

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

## PART 2 - PRODUCTS

### 2.1 PANELING, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of plastic-laminate-faced wood paneling (decorative laminate surfacing) indicated for construction, finishes, installation, and other requirements.
  - 1. Provide certificates from AWI certification program indicating that paneling complies with requirements of grades specified.
  - 2. The Contract Documents contain selections chosen from options in the quality standard and additional requirements beyond those of the quality standard. Comply with those selections and requirements in addition to the quality standard.
- B. Regional Materials: Paneling shall be manufactured within 500 miles (800 km) of Project site.
  - 1. Composite wood materials used for paneling shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered within 500 miles (800 km) of Project site.

### 2.2 PLASTIC-LAMINATE-FACED WOOD PANELING

- A. Grade: Custom.
- B. Certified Wood: Wood and composite wood components of plastic-laminate-clad flush paneling shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
- C. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3 and as indicated on the Drawings.

- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors and textures of exposed surfaces complying with the following requirements:
  - 1. As indicated by manufacturer's designations.
- E. Panel Core: Fire-retardant medium-density fiberboard.
  - 1. Thickness: 3/4 inch (19 mm).
- F. Exposed Panel Edges: Legs of metal channels forming reveals.
- G. Panel Reveals: Stainless-steel channels and extrusions, size and configuration as indicated.
  - 1. Reveals: As manufactured by Flannery, Inc. or comparable product approved by Architect.
  - 2. Reveals and concealed clips: As manufactured by Monarch Metal Fabrication or comparable product approved by Architect.
- H. Fire-Retardant-Treated Paneling: Panels shall consist of fire-retardant plastic laminate and medium-density fiberboard. Panels shall have a flame-spread index of 25 or less and a smoke-developed index of 450 or less per ASTM E 84 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
- I. Assemble panels by gluing and concealed fastening.

### 2.3 WOOD VENEER-FACE WOOD CORE PANELING

- A. Grade: Custom.
- B. Certified Wood: Wood and composite wood components of plastic-laminate-clad flush paneling shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
- C. Veneer:
  - 1. Grade: Custom (Grade A faces).
  - 2. Species: Select birch.
  - 3. Cut: Rift cut.
- D. Finish: Comply with referenced quality standard for factory finishing. Semi-Transparent Finish:
  - 1. Grade: Custom.
  - 2. Finish: AWI catalyzed polyurethane system.
  - 3. Staining: Minimum of two different door colors. Stain colors shall be custom non-natural stains (eg. Dark Blue.) to match sample in Architect's office.
  - 4. Sheen: Semi-gloss.
- E. Panel Core: Fire-retardant medium-density fiberboard.
  - 1. Thickness: 3/4 inch (19 mm).
- F. Exposed Panel Edges: Legs of metal channels forming reveals.
- G. Panel Reveals: Stainless-steel channels and extrusions, size and configuration as indicated.
  - 1. Reveals: As manufactured by Flannery, Inc. or comparable product approved by Architect.
  - 2. Reveals and concealed clips: As manufactured by Monarch Metal Fabrication or comparable product approved by Architect.

- H. Fire-Retardant-Treated Paneling: Panels shall consist of fire-retardant plastic laminate and medium-density fiberboard. Panels shall have a flame-spread index of 25 or less and a smoke-developed index of 450 or less per ASTM E 84 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
- I. Assemble panels by gluing and concealed fastening.

## 2.4 MATERIALS

- A. Materials, General: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.
- B. Wood Moisture Content: 4 to 9 percent.
- C. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each quality grade specified unless otherwise indicated.
  - 1. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
  - 2. Medium-Density Fiberboard: ANSI A208.2, Grade 130, made with binder containing no urea formaldehyde.
- D. Adhesives: Do not use adhesives that contain urea formaldehyde.

## 2.5 FIRE-RETARDANT-TREATED MATERIALS

- A. Fire-Retardant-Treated Materials, General: Where fire-retardant-treated materials are indicated, use materials complying with requirements in this article, that are acceptable to authorities having jurisdiction, and with fire-test-response characteristics specified as determined by testing identical products per test method indicated by a qualified testing agency.
  - 1. Use treated materials that comply with requirements of referenced woodworking standard. Do not use materials that are warped, discolored, or otherwise defective.
  - 2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants to distinguish treated materials from untreated materials.
  - 3. Identify fire-retardant-treated materials with appropriate classification marking of qualified testing agency in the form of removable paper label or imprint on surfaces that will be concealed from view after installation.
- B. Fire-Retardant Fiberboard: Medium-density fiberboard panels complying with ANSI A208.2, made from softwood fibers, synthetic resins, and fire-retardant chemicals mixed together at time of panel manufacture to achieve flame-spread index of 25 or less and smoke-developed index of 200 or less per ASTM E 84.

## 2.6 INSTALLATION MATERIALS

- A. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- B. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls.
- C. VOC Limits for Installation Adhesives: Use products that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Wood Glues: 30 g/L.
2. Multipurpose Construction Adhesives: 70 g/L.
3. Contact Adhesive: 80 g/L.
4. Special-Purpose Contact Adhesive (contact adhesive that is used to bond melamine-covered board, metal, unsupported vinyl, rubber, or wood veneer 1/16 inch (1.6 mm) or less in thickness to any surface): 250 g/L.

## 2.7 FABRICATION

- A. Sand fire-retardant-treated wood lightly to remove raised grain on exposed surfaces before fabrication.
- B. Complete fabrication, including assembly, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.
  1. Notify Architect seven days in advance of the dates and times paneling fabrication will be complete.
- C. Shop cut openings, to maximum extent possible, to receive hardware, appliances, plumbing fixtures, electrical work, and similar items. Locate openings accurately and use templates or roughing-in diagrams to produce accurately sized and shaped openings. Sand edges of cutouts to remove splinters and burrs.

## PART 3 - EXECUTION

### 3.1 PREPARATION

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

### 3.2 INSTALLATION

- A. Grade: Install paneling to comply with same grade as paneling to be installed.
- B. Install paneling level, plumb, true, and straight with no distortions. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches (3 mm in 2400 mm). Install with no more than 1/16 inch in 96-inch (1.6 mm in 2400-mm) vertical cup or bow and 1/8 inch in 96-inch (3 mm in 2400-mm) horizontal variation from a true plane.
  1. For flush paneling with revealed joints, install with variations in reveal width, alignment of top and bottom edges, and flushness between adjacent panels not exceeding 1/32 inch (0.8 mm).
- C. Anchor paneling to supporting substrate with concealed panel-hanger clips. Do not use face fastening unless.

### 3.3 ADJUSTING AND CLEANING

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

SECTION 07 11 13

BITUMINOUS DAMPPROOFING

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. Cold-applied, cut-back-asphalt dampproofing.
- B. Related Requirements:
  - 1. Section 07 13 26 "Self-Adhering Sheet Waterproofing" for waterproofing.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
  - 1. Product Data for Credit IEQ 4.2: For dampproofing, documentation including printed statement of VOC content.

1.4 FIELD CONDITIONS

- A. Weather Limitations: Proceed with application only when existing and forecasted weather conditions permit dampproofing to be performed according to manufacturers' written instructions.
- B. Ventilation: Provide adequate ventilation during application of dampproofing in enclosed spaces. Maintain ventilation until dampproofing has cured.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide auxiliary materials recommended in writing by manufacturer of primary materials.
- B. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise required.

## 2.2 COLD-APPLIED, CUT-BACK-ASPHALT DAMPPROOFING

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. APOC, Inc.; a division of Gardner-Gibson.
  - 2. BASF Construction Chemicals - Building Systems; Sonneborn Brand Products.
  - 3. Brewer Company (The).
  - 4. ChemMasters, Inc.
  - 5. Euclid Chemical Company (The); an RPM company.
  - 6. Henry Company.
  - 7. Karnak Corporation.
  - 8. Koppers Inc.
  - 9. Malarkey Roofing Products.
  - 10. Meadows, W. R., Inc.
- B. Brush and Spray Coats: ASTM D 4479, Type I, fibered or nonfibered.

## 2.3 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.
- B. Cut-Back-Asphalt Primer: ASTM D 41.
- C. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.
- D. Patching Compound: Epoxy or latex-modified repair mortar of type recommended in writing by dampproofing manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions with Applicator present, for compliance with requirements for surface smoothness, surface moisture, and other conditions affecting performance of bituminous dampproofing work.
  - 1. Test for surface moisture according to ASTM D 4263.
- B. Proceed with application only after substrate construction and penetrating work have been completed and unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Mask or otherwise protect adjoining exposed surfaces from being stained, spotted, or coated with dampproofing. Prevent dampproofing materials from entering and clogging weep holes and drains.
- B. Clean substrates of projections and substances detrimental to the dampproofing work; fill voids, seal joints, and remove bond breakers if any, as recommended in writing by prime material manufacturer.
- C. Apply patching compound to patch and fill tie holes, honeycombs, reveals, and other imperfections.

3.3 APPLICATION, GENERAL

- A. Comply with manufacturer's written instructions for dampproofing application, cure time between coats, and drying time before backfilling unless more stringent requirements are indicated.
  - 1. Apply dampproofing to provide continuous plane of protection.
  - 2. Apply additional coats if recommended in writing by manufacturer or to achieve a smooth surface and uninterrupted coverage.

3.4 COLD-APPLIED, CUT-BACK-ASPHALT DAMPPROOFING

- A. Unexposed Face of Concrete Retaining Walls: Apply one brush or spray coat at not less than 1.25 gal./100 sq. ft. (0.5 L/sq. m).
- B. Unexposed Face of Masonry Retaining Walls: Apply primer and one brush or spray coat at not less than 1.25 gal./100 sq. ft. (0.5 L/sq. m).

3.5 CLEANING

- A. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended in writing by manufacturer of affected construction.

END OF SECTION 07 11 13

SECTION 07 13 26

SELF-ADHERING SHEET WATERPROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Modified bituminous sheet waterproofing.
  - 2. Molded-sheet drainage panels.
- B. Related Sections include the following:
  - 1. Division 7 Section "Joint Sealants" for joint-sealant materials and installation.
  - 2. Division 7 Section "Dampproofing" for dampproofing at retaining walls and where indicated.

1.3 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate, technical data, and tested physical and performance properties of waterproofing.
- B. LEED Submittals:
  - 1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
- C. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.
- D. Qualification Data: For Installer.
- E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for waterproofing.
- F. Warranties: Special warranties specified in this Section.

1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that is acceptable to waterproofing manufacturer for installation of waterproofing required for this Project.
- B. Source Limitations: Obtain waterproofing materials, protection course, molded-sheet drainage panels through one source from a single manufacturer.

- C. Mockups: Before beginning installation, install waterproofing to 100 sq. ft. (9.3 sq. m) of wall to demonstrate surface preparation, crack and joint treatment, corner treatment, and execution quality.
  - 1. If Architect determines mockups do not comply with requirements, reapply waterproofing until mockups are approved.
  - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver liquid materials to Project site in original packages with seals unbroken, labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by waterproofing manufacturer.
- C. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- D. Store rolls according to manufacturer's written instructions.
- E. Protect stored materials from direct sunlight.

#### 1.6 PROJECT CONDITIONS

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

#### 1.7 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to replace waterproofing material that does not comply with requirements or that fails to remain watertight within specified warranty period.
  - 1. Warranty does not include failure of waterproofing due to failure of substrate prepared and treated according to requirements or formation of new joints and cracks in substrate exceeding 1/16 inch (1.6 mm) in width.
  - 2. Warranty Period: Three years from date of Substantial Completion.
- B. Special Installer's Warranty: Specified form, signed by Installer, covering Work of this Section, for warranty period of two years.
  - 1. Warranty includes removing and reinstalling protection board, drainage panels.

### PART 2 - PRODUCTS

#### 2.1 MODIFIED BITUMINOUS SHEET WATERPROOFING

- A. Modified Bituminous Sheet: Not less than 60-mil- (1.5-mm-) thick, self-adhering sheet consisting of 56 mils (1.4 mm) of rubberized asphalt laminated to a 4-mil- (0.10-mm-) thick, polyethylene film with release liner on adhesive side and formulated for application with primer or surface conditioner that complies with VOC limits of authorities having jurisdiction.

1. Physical Properties:

- a. Tensile Strength: 250 psi (1.7 MPa) minimum; ASTM D 412, Die C, modified.
- b. Ultimate Elongation: 300 percent minimum; ASTM D 412, Die C, modified.
- c. Low-Temperature Flexibility: Pass at minus 20 deg F (minus 29 deg C); ASTM D 1970.
- d. Crack Cycling: Unaffected after 100 cycles of 1/8-inch (3-mm) movement; ASTM C 836.
- e. Puncture Resistance: 40 lbf (180 N) minimum; ASTM E 154.
- f. Hydrostatic-Head Resistance: 150 feet (45 m) minimum; ASTM D 5385.
- g. Water Absorption: 0.15 percent weight-gain maximum after 48-hour immersion at 70 deg F (21 deg C); ASTM D 570.
- h. Vapor Permeance: 0.05 perms (2.9 ng/Pa x s x sq. m); ASTM E 96, Water Method.

## 2.2 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended by waterproofing manufacturer for intended use and compatible with sheet waterproofing.
1. Furnish liquid-type auxiliary materials that comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid waterborne primer recommended for substrate by manufacturer of sheet waterproofing material.
- C. Surface Conditioner: Liquid, waterborne surface conditioner recommended for substrate by manufacturer of sheet waterproofing material.
- D. Substrate Patching Membrane: Low-viscosity, two-component, asphalt-modified coating.
- E. Sheet Strips: Self-adhering, rubberized-asphalt sheet strips of same material and thickness as sheet waterproofing.
- F. Mastic, Adhesives, and Tape: Liquid mastic and adhesives, and adhesive tapes recommended by waterproofing manufacturer.
- G. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 1/2 inch (13 mm) thick.

## 2.3 MOLDED-SHEET DRAINAGE PANELS

- A. Nonwoven-Geotextile-Faced, Molded-Sheet Drainage Panel: Manufactured composite subsurface drainage panels consisting of a nonwoven, needle-punched geotextile facing with an apparent opening size not exceeding No. 70 (0.21-mm) sieve laminated to one side with or without a polymeric film bonded to the other side of a studded, nonbiodegradable, molded-plastic-sheet drainage core, with a vertical flow rate of 9 to 15 gpm per ft. (112 to 188 L/min. per m).

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
  - 1. Verify that concrete has cured and aged for minimum time period recommended by waterproofing manufacturer.
  - 2. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
  - 3. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 SURFACE PREPARATION

- A. Clean, prepare, and treat substrates according to manufacturer's written instructions. Provide clean, dust-free, and dry substrates for waterproofing application.
- B. Mask off adjoining surfaces not receiving waterproofing to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids.
- E. Prepare, fill, prime, and treat joints and cracks in substrates. Remove dust and dirt from joints and cracks according to ASTM D 4258.
  - 1. Install sheet strips and center over treated construction and contraction joints and cracks exceeding a width of 1/16 inch (1.6 mm).
- F. Corners: Prepare, prime, and treat inside and outside corners according to ASTM D 6135.
  - 1. Install membrane strips centered over vertical inside corners. Install 3/4-inch (19-mm) fillets of liquid membrane on horizontal inside corners and as follows:
    - a. At footing-to-wall intersections, extend liquid membrane each direction from corner or install membrane strip centered over corner.
- G. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through waterproofing and at drains and protrusions according to ASTM D 6135.

### 3.3 MODIFIED BITUMINOUS SHEET WATERPROOFING APPLICATION

- A. Install modified bituminous sheets according to waterproofing manufacturer's written instructions and according to recommendations in ASTM D 6135.
- B. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by sheet waterproofing in same day. Reprime areas exposed for more than 24 hours.
- C. Apply and firmly adhere sheets over area to receive waterproofing. Accurately align sheets and maintain uniform 2-1/2-inch- (64-mm-) minimum lap widths and end laps. Overlap and seal seams and stagger end laps to ensure watertight installation.
  - 1. When ambient and substrate temperatures range between 25 and 40 deg F (minus 4 and plus 5 deg C), install self-adhering, modified bituminous sheets produced for low-temperature application. Do not use low-temperature sheets if ambient or substrate temperature is higher than 60 deg F (16 deg C).

- D. Two-Ply Application: Install sheets to form a membrane with lap widths not less than 50 percent of sheet widths to provide a minimum of 2 thicknesses of sheet membrane over areas to receive waterproofing.
- E. Horizontal Application: Apply sheets from low point to high point of decks to ensure that side laps shed water.
- F. Apply continuous sheets over sheet strips bridging substrate cracks, construction, and contraction joints.
- G. Seal exposed edges of sheets at terminations not concealed by metal counterflashings or ending in reglets with mastic.
- H. Install sheet waterproofing and auxiliary materials to tie into adjacent waterproofing.
- I. Repair tears, voids, and lapped seams in waterproofing not complying with requirements. Slit and flatten fishmouths and blisters. Patch with sheet waterproofing extending 6 inches (150 mm) beyond repaired areas in all directions.
- J. Install protection course with butted joints over waterproofing membrane immediately. Molded-sheet drainage panels may be used in place of a separate protection course to vertical applications when approved by waterproofing manufacturer and installed immediately.
- K. Correct deficiencies in or remove sheet waterproofing that does not comply with requirements; repair substrates, reapply waterproofing, and repair sheet flashings.

#### 3.4 MOLDED-SHEET DRAINAGE PANEL INSTALLATION

- A. Place and secure molded-sheet drainage panels, with geotextile facing away from wall or deck substrate, according to manufacturer's written instructions. Use adhesives that do not penetrate waterproofing. Lap edges and ends of geotextile to maintain continuity. Protect installed molded-sheet drainage panels during subsequent construction. For vertical applications, install protection course before installing drainage panels.

#### 3.5 PROTECTION AND CLEANING

- A. Protect waterproofing from damage and wear during remainder of construction period.
- B. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 13 26

SECTION 07 19 00  
WATER REPELLENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes penetrating water-repellent coatings for the following vertical and horizontal surfaces:
  - 1. Concrete (unpainted vertical surfaces).
  - 2. Concrete Unit Masonry (exterior surface).

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
  - 1. Include manufacturer's printed statement of VOC content.
  - 2. Include manufacturer's standard colors.
  - 3. Include manufacturer's recommended number of coats for each type of substrate and spreading rate for each separate coat.
- B. Product test reports.
- C. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer and Applicator agree(s) to repair or replace materials that fail to maintain water repellency within five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PENETRATING WATER REPELLENTS

- A. Silane/Siloxane-Blend, Penetrating Water Repellent: Clear, silane and siloxane blends with 3.3 lb/gal. (400 g/L) or less of VOCs.
  - 1. Available Products:
    - a. Anti-Hydro International, Inc.; Aridox 40, Aridox 40 VOC, and Aridsil VOC.
    - b. Chemprobe Coating Systems, L. P.; Deck A Pell 15%.
    - c. Gemite Products, Inc.; Gem Guard SX.
    - d. Hydrozo, a division of ChemRex; Enviroseal 7.
    - e. L&M Construction Chemicals, Inc.; Aquapel.

- f. Pecora Corporation; 910W.
- g. ProSoCo, Inc.; SL 100 Water Repeller.
- h. Seal-Krete, Inc.; Silane/Siloxane Water Repellent.
- i. Sonneborn Building Products, a division of ChemRex; White Roc 10 WB.
- j. Tamms Industries, Inc.; Baracade WB 244.
- k. Textured Coatings of America, Inc.; RSI 1750 W Stain.
- l. Wacker Chemical Corp.; OH 100.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean substrate of substances that might interfere with penetration or performance of water repellents. Test for moisture content, according to water-repellent manufacturer's written instructions, to ensure that surface is dry enough.
  - 1. Cast-in-Place Concrete: Remove oil, curing compounds, laitance, and other substances that could prevent adhesion or penetration of water repellents.
- B. Test for pH level, according to water-repellent manufacturer's written instructions, to ensure chemical bond to silicate minerals.
- C. Protect adjoining work, including sealant bond surfaces, from spillage or blow-over of water repellent. Cover adjoining and nearby surfaces of aluminum and glass if there is the possibility of water repellent being deposited on surfaces. Cover live plants and grass.
- D. Coordination with Sealants: Do not apply water repellent until sealants for joints adjacent to surfaces receiving water-repellent treatment have been installed and cured.
  - 1. Water-repellent work may precede sealant application only if sealant adhesion and compatibility have been tested and verified using substrate, water repellent, and sealant materials identical to those used in the work.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 APPLICATION

- A. Manufacturer's Field Service: Engage a factory-authorized service representative to inspect the substrate before application of water repellent and to instruct Applicator on the product and application method to be used.
- B. Apply a heavy-saturation spray coating of water repellent on surfaces indicated for treatment using low-pressure spray equipment. Comply with manufacturer's written instructions for using airless spraying procedure, unless otherwise indicated.
- C. Apply a second saturation spray coating, repeating first application. Comply with manufacturer's written instructions for limitations on drying time between coats and after rainstorm wetting of surfaces between coats. Consult manufacturer's technical representative if written instructions are not applicable to Project conditions.

3.3 CLEANING

- A. Immediately clean water repellent from adjoining surfaces and surfaces soiled or damaged by water-repellent application as work progresses. Repair damage caused by water-repellent application. Comply with manufacturer's written cleaning instructions.

END OF SECTION 07 19 00

SECTION 07 21 00

THERMAL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes (where indicated on drawings):

1. Insulation at slabs-on-grade: High density extruded-polystyrene board insulation.
2. Foundation wall insulation (supporting backfill): Extruded-polystyrene board insulation.
3. Cavity wall insulation: Glass-fiber blanket insulation.
4. Safing insulation: Mineral-fiber insulation.
5. Concealed insulation above ceiling on back of precast concrete: Spray polyurethane foam insulation.
6. Vapor retarders (not required at locations with foil-backed insulation).

- B. Related Sections:

1. Section 07 13 26 "Self-Adhering Sheet Waterproofing" for insulated drainage panels installed with waterproofing.
2. Section 07 54 16 "Ethylene Interpolymer (KEE) Roofing" for insulation specified as part of roofing construction.

1.3 ACTION SUBMITTALS

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

- B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.

- B. Research/Evaluation Reports: For foam-plastic insulation, from ICC-ES.

1.5 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

## 1.6 DELIVERY, STORAGE, AND HANDLING

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

## PART 2 - PRODUCTS

### 2.1 FOAM-PLASTIC BOARD INSULATION

- A. Extruded-Polystyrene Board Insulation: ASTM C 578, of type and minimum compressive strength indicated below, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. DiversiFoam Products.
    - b. Dow Chemical Company (The).
    - c. Owens Corning.
    - d. Pactiv Building Products.
  - 2. Type IV, 25 psi (173 kPa) at foundation walls.
  - 3. Type VII, 60 psi (414 kPa) where indicated under slabs-on-grade (high density).
- B. Adhesive for Bonding Insulation: Product with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

### 2.2 GLASS-FIBER BLANKET INSULATION

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. CertainTeed Corporation.
  - 2. Guardian Building Products, Inc.
  - 3. Johns Manville.
  - 4. Knauf Insulation.
  - 5. Owens Corning.
- B. Foil-Faced, Glass-Fiber Blanket Insulation: ASTM C 665, Type III (reflective faced), Class B (faced surface with a flame-propagation resistance of 0.12 W/sq. cm); Category 1 (membrane is a vapor barrier), faced with foil scrim, foil-scrim kraft, or foil-scrim polyethylene.
- C. Sustainability Requirements: Provide glass-fiber blanket insulation as follows:
  - 1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and no formaldehyde.

2. Low Emitting: Insulation tested according to ASTM D 5116 and shown to emit less than 0.05-ppm formaldehyde.

### 2.3 SPRAY POLYURETHANE FOAM INSULATION

- A. Closed-Cell Polyurethane Foam Insulation: ASTM C 1029, Type II, with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, per ASTM E 84.
  1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. BASF Corporation.
    - b. BaySystems NorthAmerica, LLC.
    - c. Dow Chemical Company (The).
    - d. ERSystems, Inc.
    - e. Gaco Western Inc.
    - f. Henry Company.
    - g. NCFI; Division of Barnhardt Mfg. Co.
    - h. SWD Urethane Company.
    - i. Volatile Free, Inc.
  2. Minimum density of 1.5 lb/cu. ft. (24 kg/cu. m), thermal resistivity of 6.2 deg F x h x sq. ft./Btu x in. at 75 deg F (43 K x m/W at 24 deg C).
  3. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 75 percent.

### 2.4 SAFING INSULATION

- A. Safing Insulation Description: Fire and smoke seal application of insulation at exterior wall envelop. Typically the insulation from the edge of concrete slab to back of curtain wall.
- B. Safing Insulation: Mineral fiber fire containment insulation, unfaced, with fire-resistant sealing compound. Safing Insulation shall comply with the following:
  1. ASTM C 665, non-corrosive Type I, III.
  2. ASTM C 612, Type IA, IB, II.
  3. ASTM E 136, rated non-combustible per NFPA Standard 220.
  4. ASTM D 96, unfaced, 50 perms as tested.
  5. ASTM C 1104, Absorbs less than 1% by volume.
  6. ASTM E 814 or UL 1479.
  7. Density: Minimum 4.0 pcf.
  8. R-Value: Minimum 4.2 per inch.
  9. Flame spread: 0.
  10. Smoke Developed: 0.
- C. Provide "Thermafiber Safing" as manufactured by US Gypsum Co. or comparable product approved by Architect.

### 2.5 VAPOR RETARDERS

- A. For vapor barriers under slabs-on-grade refer to Section 03 33 00 – Cast-in-Place Concrete.
- B. Polyethylene Vapor Retarders: ASTM D 4397, 6 mils (0.15 mm) thick, with maximum permeance rating of 0.13 perm (7.5 ng/Pa x s x sq. m).

- C. Vapor-Retarder Tape: Pressure-sensitive tape of type recommended by vapor-retarder manufacturer for sealing joints and penetrations in vapor retarder.

## 2.6 INSULATION FASTENERS

- A. Mechanically fasten or adhesive apply insulation according to manufacturer's written recommendations. Furnish fasteners or adhesive compatible with application to substrate.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Clean substrates of substances that are harmful to insulation or that interfere with insulation attachment.

### 3.2 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications indicated.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Cut and fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications indicated and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units to produce thickness indicated unless multiple layers are otherwise shown or required to make up total thickness.

### 3.3 INSTALLATION OF BELOW-GRADE INSULATION

- A. On vertical surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
- B. Horizontally under slabs-on-grade, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units.
  - 1. If not otherwise indicated, extend insulation a minimum of 24 inches (610 mm) in from exterior walls.

### 3.4 INSTALLATION OF INSULATION FOR FRAMED CONSTRUCTION

- A. Apply insulation units to substrates by method indicated, complying with manufacturer's written instructions. If no specific method is indicated, bond units to substrate with adhesive or use mechanical anchorage to provide permanent placement and support of units.
- B. Glass-Fiber Blanket Insulation: Install in cavities formed by framing members according to the following requirements:
  - 1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.

2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
  3. Maintain 3-inch (76-mm) clearance of insulation around recessed lighting fixtures not rated for or protected from contact with insulation.
  4. For metal-framed wall cavities where cavity heights exceed 96 inches (2438 mm), support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
  5. Vapor-Retarder-Faced Blankets: Tape joints and ruptures in vapor-retarder facings, and seal each continuous area of insulation to ensure airtight installation.
    - a. Exterior Walls: Set units with facing placed toward interior of construction.
- C. Spray-Applied Insulation: Apply spray-applied insulation according to manufacturer's written instructions. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.
- D. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

### 3.5 INSTALLATION OF CURTAIN-WALL INSULATION

- A. Install board insulation in curtain-wall construction where indicated on Drawings according to curtain-wall manufacturer's written instructions.
1. Install insulation where it contacts perimeter fire-containment system to prevent insulation from bowing under pressure from perimeter fire-containment system.

### 3.6 INSTALLATION OF VAPOR RETARDERS

- A. Place vapor retarders on side of construction indicated on Drawings. Extend vapor retarders to extremities of areas to protect from vapor transmission. Secure vapor retarders in place with adhesives or other anchorage system as indicated. Extend vapor retarders to cover miscellaneous voids in insulated substrates.
- B. Seal joints caused by pipes, conduits, electrical boxes, and similar items penetrating vapor retarders with vapor-retarder tape to create an airtight seal between penetrating objects and vapor retarders.
- C. Repair tears or punctures in vapor retarders immediately before concealment by other work. Cover with vapor-retarder tape or another layer of vapor retarders.

### 3.7 PROTECTION

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

END OF SECTION 07 21 00

SECTION 07 21 13

RIGID EXTERIOR WALL INSULATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Extruded polystyrene foam-plastic board.
  - 2. Molded polystyrene foam-plastic board.
  - 3. Polyisocyanurate foam-plastic board.
  - 4. Glass-fiber board.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Sustainable Design Submittals:
  - 1. Product Data: For recycled content, indicating postconsumer and preconsumer recycled content and cost.
  - 2. Product Data: For adhesives, indicating VOC content.
  - 3. Laboratory Test Reports: For Insulation, indicating compliance with requirements for low-emitting materials.

1.4 INFORMATIONAL SUBMITTALS

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

1.5 DELIVERY, STORAGE, AND HANDLING

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

## PART 2 - PRODUCTS

### 2.1 RIGID EXTERIOR WALL INSULATION

- A. General: Contract's Option: Provide one of the following types of commercial insulation board. Selection is contingent on Architect approval and coordination with metal panel fasteners. Metal panel fasteners shall not be used to support rigid insulation. Metal panel fasteners shall support metal panels separate from insulation.
1. Extruded polystyrene foam-plastic board.
  2. Molded polystyrene foam-plastic board.
  3. Polyisocyanurate foam-plastic board.
  4. Glass-fiber board.
- B. Thickness shall be as required to achieve a minimum R-10 insulation value.

### 2.2 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD

- A. Extruded polystyrene boards in this article are also called "XPS boards." Roman numeral designators in ASTM C 578 are assigned in a fixed random sequence, and their numeric order does not reflect increasing strength or other characteristics.
- B. Extruded Polystyrene Board, Type X: ASTM C 578, Type X, 15-psi (104-kPa) minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
- C. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. DiversiFoam Products.
  2. Dow Chemical Company (The).
  3. Owens Corning.

### 2.3 MOLDED POLYSTYRENE FOAM-PLASTIC BOARD

- A. Molded Polystyrene Board, Type II: ASTM C 578, Type II, 15-psi (104-kPa) minimum compressive strength.
- B. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. ACH Foam Technologies, LLC.
  2. DiversiFoam Products.
  3. Insulfoam LLC; a Carlisle company.
  4. Plymouth Foam, Inc.

### 2.4 POLYISOCYANURATE FOAM-PLASTIC BOARD

- A. Polyisocyanurate Board, Foil Faced: ASTM C 1289, foil faced, Type I, Class 1 or 2.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Atlas Roofing Corporation.
  2. Carlisle Coatings & Waterproofing Inc.

## RIGID EXTERIOR WALL INSULATION

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3. Dow Chemical Company (The).
4. Firestone Building Products.
5. Hunter Panels.
6. Rmax, Inc.

## 2.5 GLASS-FIBER BOARD

- A. Recycled Content: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 20 percent.
- B. Glass-Fiber Board, Faced: ASTM C 612, Type IA; faced on one side with foil-scrim-kraft or foil-scrim-polyethylene vapor retarder, with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84. Nominal density of 3 lb/cu. ft. (48 kg/cu. m), thermal resistivity of 4.3 deg F x h x sq. ft./Btu x in. at 75 deg F (29.8 K x m/W at 24 deg C).
- C. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  1. CertainTeed Corporation.
  2. Johns Manville; a Berkshire Hathaway company.
  3. Knauf Insulation.
  4. Owens Corning.

## 2.6 INSULATION FASTENERS

- A. Provide manufacturer approved insulation fasteners or adhesive and as approved by Architect.
  1. Adhesives shall have a VOC content of 70 g/L or less.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's written instructions applicable to products and applications.
- B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
- C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
- D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.

### 3.2 PROTECTION

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

END OF SECTION 07 21 13

RIGID EXTERIOR WALL INSULATION

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SECTION 07 24 13

POLYMER-BASED EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)

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. Finish system only of an EIFS applied on exterior soffit board.

1.3 PERFORMANCE REQUIREMENTS

- A. EIFS Performance: Comply with the following:

- 1. Bond Integrity: Free from bond failure within components or between system and supporting construction, resulting from exposure to fire, wind loads, weather, or other in-service conditions.
- 2. Weathertightness: Resistant to water penetration from exterior into assemblies behind it or through them into interior of building that results in deterioration of assemblies behind it, including substrates, supporting wall construction, and interior finish.

- B. Provide finish of Class PB EIFS.

1.4 ACTION SUBMITTALS

- A. Product Data: For each component indicated.

- B. Samples for Initial Selection: For each type of finish-coat color and texture indicated.

- 1. Include similar Samples of joint sealants involving color selection.

- C. Samples for Verification: 24-inch- (600-mm-) square panels for each type of finish-coat color and texture indicated, prepared using same tools and techniques intended for actual work including a typical control joint filled with sealant of color selected.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finish to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer who is certified in writing by EIFS manufacturer as qualified to install manufacturer's system using trained workers.

- B. Surface-Burning Characteristics: Provide adhesives, base coats, and finish coats with flame-spread index of 25 or less and smoke-developed index of 450 or less, per ASTM E 84 or UBC Standard 8-1.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original, unopened packages with manufacturers' labels intact and clearly identifying products.
- B. Store materials inside and under cover; keep them dry and protected from weather, direct sunlight, surface contamination, aging, corrosion, damaging temperatures, construction traffic, and other causes.
  - 1. Maximum storage temperature shall not exceed 38° C (100 °F). Minimize exposure of materials to temperatures over 32 °C (90 °F). Finishes exposed to temperatures over 43 °C (110 °F) for even short periods may exhibit skinning, increased viscosity and shall be inspected prior to use.
  - 2. Protect all products from inclement weather and direct sunlight.

#### 1.8 PROJECT CONDITIONS

- A. Weather Limitations: Maintain ambient temperatures above 40 deg F (4.4 deg C) for a minimum of 24 hours before, during, and after adhesives or coatings are applied. Do not apply EIFS adhesives or coatings during rainfall. Proceed with installation only when existing and forecasted weather conditions and ambient outdoor air, humidity, and substrate temperatures permit EIFS to be applied, dried, and cured according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify actual dimensions required for prefabricated panels by field measurements before fabrication.

#### 1.9 WARRANTY

- A. Manufacturer shall provide a written limited materials warranty against defective material.
  - 1. Warrantee Period: 5 years.

### PART 2 - PRODUCTS

#### 2.1 SYSTEM DESCRIPTION

- A. General: Finish System, Class PB, consisting of an adhesive, base coat, reinforcing mesh and finish.
- B. Methods of Installation: Field Applied: The finish is applied to the substrate system in place.
- C. Substrate: Soffit board.
- D. Sealants shall be compatible with materials. Sealant backer rod shall be closed cell.

#### 2.2 MANUFACTURERS

- A. Basis of Design: Design is based on "Outsulation" EIFS products manufactured by Dryvit Systems, Inc. Subject to compliance with requirements, other manufacturers offering equivalent products may be incorporated into the Work subject to the approval of the Architect.

## 2.3 MATERIALS

- A. Compatibility: Provide adhesive, reinforcing meshes, base- and finish-coat systems, sealants, and accessories that are compatible with one another and with substrates and approved for use by manufacturer for Project.
- B. Reinforcing Mesh: Balanced, alkali-resistant, open-weave, glass-fiber mesh treated for compatibility with other EIFS materials, made from continuous multiend strands with retained mesh tensile strength of not less than 120 lbf/in. (21 dN/cm) per ASTM E 2098; complying with ASTM D 578 and the following:
  - 1. Intermediate-Impact Reinforcing Mesh: Not less than 10 oz./sq. yd. (339 g/sq. m).
- C. Base-Coat Materials: EIFS manufacturer's standard mixture complying with one of the following:
  - 1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
  - 2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
  - 3. Factory-blended dry formulation of portland cement, dry polymer admixture, and inert fillers to which only water is added at Project site.
  - 4. Factory-mixed noncementitious formulation of polymer-emulsion adhesive and inert fillers that is ready to use without adding other materials.
- D. Waterproof Adhesive/Base-Coat Materials: At horizontal locations (copings, sills, etc.) EIFS manufacturer's standard waterproof formulation and complying with one of the following:
  - 1. Job-mixed formulation of portland cement complying with ASTM C 150, Type I, white or natural color; and manufacturer's standard polymer-emulsion adhesive designed for use with portland cement.
  - 2. Job-combined formulation of manufacturer's standard polymer-emulsion adhesive and manufacturer's standard dry mix containing portland cement.
- E. Finish-Coat Materials: EIFS manufacturer's standard acrylic-based coating.
  - 1. Colors: As selected by Architect from manufacturer's full range.

## 2.4 ELASTOMERIC SEALANTS

- A. Elastomeric Sealant Products: Provide EIFS manufacturer's listed and recommended chemically curing, elastomeric sealant that is compatible with joint fillers, joint substrates, and other related materials, and complies with requirements for products and testing indicated in ASTM C 1481.
- B. Sealant Color: As selected by Architect from manufacturer's full range.

## 2.5 MIXING

- A. General: Comply with EIFS manufacturer's requirements for combining and mixing materials. Do not introduce admixtures, water, or other materials except as recommended by EIFS manufacturer. Mix materials in clean containers. Use materials within time period specified by EIFS manufacturer or discard.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of EIFS.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
  - 1. Begin coating application only after surfaces are dry.
  - 2. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

- A. Protect contiguous work from moisture deterioration and soiling caused by application of finish. Provide temporary covering and other protection needed to prevent spattering of exterior finish coats on other work.
- B. Protect substrates, and construction behind them from inclement weather during installation. Prevent penetration of moisture behind finish and deterioration of substrates.
- C. Prepare and clean substrates to comply with manufacturer's written instructions to obtain optimum bond between substrate and adhesive for insulation.

### 3.3 INSTALLATION, GENERAL

- A. Comply with ASTM C 1397 and EIFS manufacturer's written instructions for installation of finish as applicable to each type of substrate indicated.

### 3.4 BASE-COAT INSTALLATION

- A. Base Coat: Apply to exposed surfaces of insulation in minimum thickness recommended in writing by EIFS manufacturer, but not less than 1/16-inch (1.6-mm) dry-coat thickness.
- B. Apply Waterproof Adhesive/Base-Coat Materials at horizontal locations (copings, sills, etc.).
- C. Reinforcing Mesh: Embed type indicated below in wet base coat to produce wrinkle-free installation with mesh continuous at corners and overlapped not less than 2-1/2 inches (64 mm) or otherwise treated at joints to comply with ASTM C 1397 and EIFS manufacturer's written instructions. Do not lap reinforcing mesh within 8 inches (204 mm) of corners. Completely embed mesh, applying additional base-coat material if necessary, so reinforcing-mesh color and pattern are not visible.
  - 1. Intermediate-impact reinforcing mesh.

### 3.5 FINISH-COAT INSTALLATION

- A. Finish Coat: Apply over drybase coat, maintaining a wet edge at all times for uniform appearance, in thickness required by EIFS manufacturer to produce a uniform finish of color and texture matching approved sample and free of cold joints, shadow lines, and texture variations.
  - 1. Texture: As selected by Architect from manufacturer's full range.

3.6 CLEANING AND PROTECTION

- A. Remove temporary covering and protection of other work. Promptly remove coating materials from window and door frames and other surfaces outside areas indicated to receive EIFS coatings.

END OF SECTION 07 24 13

SECTION 07 25 00

WEATHER BARRIERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Building wrap.
  - 2. UV-Resistant building wrap (exposed).

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. For building wrap, include data on air and water-vapor permeance based on testing according to referenced standards.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For water-resistive barrier, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER

- A. Building Wrap: ASTM E 1677, Type I air barrier; with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, when tested according to ASTM E 84; UV stabilized; and acceptable to authorities having jurisdiction.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. DuPont (E. I. du Pont de Nemours and Company); Tyvek CommercialWrap.
    - b. Ludlow Coated Products; Barricade Building Wrap.
    - c. Raven Industries Inc.; Fortress Pro Weather Protective Barrier.
  - 2. Water-Vapor Transmission: Not less than 28 perms, per ASTM E 96/E 96M (Procedure B).
  - 3. Water Penetration Resistance: Minimum 280 cm, per AATCC Test Method T-410.
  - 4. Air Permeance: Not more than 0.004 cfm/sq. ft. at 0.3-inch wg (0.02 L/s x sq. m at 75 Pa) when tested according to ASTM E 2178.
  - 5. Allowable UV Exposure Time: Not less than three months.

- B. Building-Wrap Tape: Pressure-sensitive plastic tape recommended by building-wrap manufacturer for sealing joints and penetrations in building wrap.

## 2.2 UV-RESISTANT WATER RESISTIVE BARRIER

- A. UV-Resistant building wrap (exposed) for open joint cladding systems: Tear-resistant and UV resistant polyester substrate with waterproof polymeric coating.
  - 1. Basis of Design: "Delta-Fassade S" as manufactured by Cosella-Dorken Products, Inc. Other products may be incorporated into the work subject to compliance with requirements and approval of Architect.
  - 2. Fire Characteristics (ASTM E84): Flame spread less than 75, smoke development less than 450.
  - 3. Breaking Strength (ASTM D882): MD not less than 47.4 lb./inch, CD not less than 28.7 lb./in.
  - 4. Elongation at Break (ASTM D882): MD not less than 40%, CD not less than 45%.
  - 5. Water Vapor Transmission (ASTM E96, Method A: 74.5 perms.
  - 6. UV Exposure: Min. 50 years.
- B. Accessories:
  - 1. Permanently elastic sealing compound for fixing and seam jointing of sheet products: "Delta Than" or comparable product approved by UV resistant building wrap manufacturer.
  - 2. Sealing tape for inner and outer connections to structural details: "Delta Flex-Band," or comparable product approved by UV resistant building wrap manufacturer.

## PART 3 - EXECUTION

### 3.1 WATER-RESISTIVE BARRIER INSTALLATION

- A. Cover exposed exterior surface of sheathing with water-resistive barrier securely fastened to framing immediately after sheathing is installed.
- B. Cover sheathing with water-resistive barrier as follows:
  - 1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
- C. Building Wrap: Comply with manufacturer's written instructions.
  - 1. Seal seams, edges, fasteners, and penetrations with tape.
  - 2. Extend into jambs of openings and seal corners with tape.

END OF SECTION 07 25 00

## SECTION 07 27 26

### FLUID-APPLIED MOISTURE BARRIERS

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Fluid-applied membrane moisture and air barrier, vapor retarding, for masonry. Air barrier and vapor retarding on sheathing is specified in Section 07 25 00 – Weather Barriers.
- B. Related Sections include the following:
  - 1. Division 04 Section "Unit Masonry" for embedded flashings.
  - 2. Division 07 Section "Thermal Insulation" for expanded polystyrene board insulation.
  - 3. Division 07 Section "Sheet Metal Flashing and Trim" for sheet metal flashings.
  - 4. Division 07 Section "Weather Barriers," for building wrap.

##### 1.3 PERFORMANCE REQUIREMENTS

- A. General: Moisture and air barrier shall be capable of performing as a continuous vapor-retarding moisture and air barrier and as a liquid-water drainage plane flashed to discharge to the exterior incidental condensation or water penetration. Moisture and air barrier assemblies shall be capable of accommodating substrate movement and of sealing substrate expansion and control joints, construction material changes, and transitions at perimeter conditions without deterioration and air leakage exceeding specified limits.

##### 1.4 SUBMITTALS

- A. Product Data: Include manufacturer's written instructions for evaluating, preparing, and treating substrate; technical data; and tested physical and performance properties of moisture and air barrier.
- B. LEED Submittals:
  - 1. Product Data for Credit IEQ 4.2: For air-barrier products, documentation including printed statement of VOC content.

##### 1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: A firm experienced in applying moisture and air barrier materials similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.
- B. Mockups: Before beginning installation of moisture and air barrier, build mockups of exterior wall assembly, 150 sq. ft. (14 sq. m), incorporating backup wall construction, external cladding, window, door

frame and sill, insulation, and flashing to demonstrate surface preparation, crack and joint treatment, and sealing of gaps, terminations, and penetrations of moisture and air barrier membrane.

1. If Architect determines mockups do not comply with requirements, reconstruct mockups and apply moisture and air barrier until mockups are approved.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store liquid materials in their original undamaged packages in a clean, dry, protected location and within temperature range required by moisture and air barrier manufacturer.
- B. Remove and replace liquid materials that cannot be applied within their stated shelf life.
- C. Store rolls according to manufacturer's written instructions.
- D. Protect stored materials from direct sunlight.

#### 1.7 PROJECT CONDITIONS

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

### PART 2 - PRODUCTS

#### 2.1 FLUID-APPLIED MEMBRANE AIR AND MOISTURE BARRIER

- A. Fluid-Applied, Vapor-Retarding Membrane Air Barrier: Elastomeric, modified bituminous or synthetic polymer membrane.
- B. VOC Content: 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24) and complying with VOC content limits of authorities having jurisdiction.
  1. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Elastomeric Modified Bituminous Membrane:
      - 1) Carlisle Coatings & Waterproofing; Barriseal.
      - 2) Henry Company; Air-Bloc 06.
      - 3) Meadows, W. R., Inc.; Air-Shield LM.
      - 4) NEI; AC AVS1.
      - 5) Tremco Incorporated; ExoAir.
    - b. Synthetic Polymer Membrane:
      - 1) Grace, W. R. & Co.; Perm-A-Barrier Liquid.
      - 2) Henry Company; Air-Bloc 21 or 21S.
      - 3) Rubber Polymer Corporation; Rub-R-Wall Airtight.
  2. Physical and Performance Properties:

- a. Membrane Air Permeance: Not to exceed 0.004 cfm x sq. ft. of surface area at 1.57-lbf/sq. ft. (0.02 L/s x sq. m of surface area at 75-Pa) pressure difference; ASTM E 2178.
- b. Membrane Vapor Permeance: Not to exceed 0.1 perm (5.8 ng/Pa x s x sq. m) Insert value; ASTM E 96.

## 2.2 AUXILIARY MATERIALS

- A. General: Auxiliary materials recommended by air barrier manufacturer for intended use and compatible with air barrier membrane. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Primer: Liquid primer recommended for substrate by manufacturer of air barrier material.
- C. Counterflashing Strip: Modified bituminous, 40-mil- (1.0-mm-) thick, self-adhering sheet consisting of 32 mils (0.8 mm) of rubberized asphalt laminated to an 8-mil- (0.2-mm-) thick, crosslaminated polyethylene film with release liner backing.
- D. Substrate Patching Membrane: Manufacturer's standard trowel-grade substrate filler.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance.
  - 1. Verify that substrates are sound and free of oil, grease, dirt, excess mortar, or other contaminants.
  - 2. Verify that concrete has cured and aged for minimum time period recommended by air barrier manufacturer.
  - 3. Verify that concrete is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D 4263.
  - 4. Verify that masonry joints are flush and completely filled with mortar.
  - 5. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 SURFACE PREPARATION

- A. Clean, prepare, treat, and seal substrate according to manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
- B. Mask off adjoining surfaces not covered by air barrier to prevent spillage and overspray affecting other construction.
- C. Remove grease, oil, bitumen, form-release agents, paints, curing compounds, and other penetrating contaminants or film-forming coatings from concrete.
- D. Remove fins, ridges, mortar, and other projections and fill honeycomb, aggregate pockets, holes, and other voids in concrete with substrate patching membrane.
- E. Remove excess mortar from masonry ties, shelf angles, and other obstructions.
- F. At changes in substrate plane, apply sealant or termination mastic beads at sharp corners and edges to form a smooth transition from one plane to another.
- G. Cover gaps in substrate plane and form a smooth transition from one substrate plane to another with stainless-steel sheet mechanically fastened to structural framing to provide continuous support for air barrier.

### 3.3 JOINT TREATMENT

- A. Concrete and Masonry: Prepare, treat, rout, and fill joints and cracks in substrate according to ASTM C 1193 and air barrier manufacturer's written instructions. Remove dust and dirt from joints and cracks complying with ASTM D 4258 before coating surfaces.
  - 1. Prime substrate and apply a single thickness of preparation coat strip extending a minimum of 3 inches (75 mm) along each side of joints and cracks. Apply a double thickness of air barrier membrane and embed a joint reinforcing strip in preparation coat.

### 3.4 MOISTURE AND AIR BARRIER MEMBRANE INSTALLATION

- A. Apply moisture and air barrier membrane to form a seal with strips and transition strips and to achieve a continuous moisture and air barrier according to moisture and air barrier manufacturer's written instructions.
- B. Apply moisture and air barrier membrane within manufacturer's recommended application temperature ranges.
- C. Apply primer to substrates at required rate and allow to dry. Limit priming to areas that will be covered by moisture and air barrier sheet in same day. Reprime areas exposed for more than 24 hours.
- D. Apply a continuous unbroken moisture and air barrier to substrates according to the following minimum thickness. Apply membrane in full contact around protrusions such as masonry ties.
- E. Correct deficiencies in or remove moisture and air barrier that does not comply with requirements; repair substrates and reapply moisture and air barrier components.

### 3.5 CLEANING AND PROTECTION

- A. Protect moisture and air barrier system from damage during application and remainder of construction period, according to manufacturer's written instructions.
- B. Clean spills, stains, and soiling from construction that would be exposed in the completed work using cleaning agents and procedures recommended by manufacturer of affected construction.
- C. Remove masking materials after installation.

END OF SECTION 07 27 26

SECTION 07 42 13

FORMED METAL WALL PANELS

PART 1 – GENERAL

1.1 SUMMARY

- A. This Section includes the following factory-formed and field-assembled metal wall panels:
  - 1. Flush profile, concealed-fastener, lap-seam metal wall and soffit panels indicated as on the Drawings.
- B. Related Sections:
  - 1. Section 07 42 16 "Insulated Core Metal Wall Panels" for foamed-in-place, laminated and honeycomb insulated metal wall panels.

1.2 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Meet with Owner, Architect, Owner's insurer if applicable, metal panel Installer, metal panel manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects metal panels, including installers of doors, windows, and louvers.
  - 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
  - 4. Examine support conditions for compliance with requirements, including alignment between and attachment to structural members.
  - 5. Review flashings, special siding details, wall penetrations, openings, and condition of other construction that affect metal panels.
  - 6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
  - 7. Review temporary protection requirements for metal panel assembly during and after installation.
  - 8. Review procedures for repair of metal panels damaged after installation.
  - 9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

- C. Shop Drawings:
    - 1. Include fabrication and installation layouts of metal panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details.
    - 2. Accessories: Include details of the flashing, trim, and anchorage systems, at a scale of not less than 1-1/2 inches per 12 inches (1:10).
  - D. Samples for Initial Selection: For each type of metal panel indicated with factory-applied finishes.
    - 1. Include Samples of trim and accessories involving color selection.
  - E. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:
    - 1. Metal Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other metal panel accessories.
- 1.4 INFORMATIONAL SUBMITTALS
- A. Product Test Reports: For each product, for tests performed by a qualified testing agency.
  - B. Sample Warranties: For special warranties.
- 1.5 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For metal panels to include in maintenance manuals.
- 1.6 QUALITY ASSURANCE
- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
  - B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
    - 1. Size: 14 ft. by 14ft. min.
    - 2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
  - B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
  - C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
  - D. Retain strippable protective covering on metal panels during installation.

## 1.8 FIELD CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

## 1.9 COORDINATION

- A. Coordinate metal panel installation with rain drainage work, flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

## 1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.

- 1. Failures include, but are not limited to, the following:
  - a. Structural failures including rupturing, cracking, or puncturing.
  - b. Deterioration of metals and other materials beyond normal weathering.

- 2. Warranty Period: Two years from date of Substantial Completion.

- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels that show evidence of deterioration of factory-applied finishes within specified warranty period.

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

- 2. Finish Warranty Period: 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Metallic-Coated Steel Sheet: Steel sheet metallic coated by the hot-dip process.
  - 1. Aluminum-Zinc Alloy-Coated Steel Sheet: ASTM A 792/A 792M, Class AZ50 coating designation, Grade 40 (Class AZM150 coating designation, Grade 275); structural quality.
  - 2. Surface: Smooth, flat finish.
- B. Panel Sealants:
  - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
  - 2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.
  - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

## 2.2 CONCEALED-FASTENER, LAP-SEAM METAL WALL PANELS

- A. General: Provide factory-formed metal wall panels designed to be field assembled by lapping and interconnecting side edges of adjacent panels and mechanically attaching through panel to supports using concealed fasteners and factory-applied sealant in side laps. Include accessories required for weathertight installation.
- B. Flush-Profile, Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and intermediate stiffening ribs symmetrically spaced between panel edges; with flush joint between panels.
  - 1. Basis-of-Design Product: The design is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the other specified manufacturers. Comparable products are subject to review and approval through the submittal process specified.
    - a. Centria IW-10A
  - 2. Available Manufacturers: Subject to compliance with requirements, manufacturer's offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Alcoa Cladding Systems.
    - b. Berridge Manufacturing Company.
    - c. CENTRIA Architectural Systems.
    - d. Fabral, Inc.
    - e. MBCI; Div. of NCI Building Systems.
    - f. Morin Corporation; a Metecno Group Company.
  - 3. Material: Aluminum-Zinc Alloy-Coated Steel Sheet, 0.0269 inch (0.70 mm) thick, minimum.
  - 4. Panel Coverage: 12 inches (305 mm)
  - 5. Panel Height: 1.5 inches (38 mm).

## 2.3 ACCESSORIES

- A. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
  - 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.
  - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
  - 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.
- B. Flashing and Trim: Formed from 0.0179-inch- (0.45-mm-) thick, zinc-coated (galvanized) steel sheet or aluminum-zinc alloy-coated steel sheet. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, bases, drips, sills, jams, corners, endwalls, framed openings, rakes, fasciae, parapet caps, soffits, reveals, and fillers. Finish flashing and trim with same finish system as adjacent metal wall panels.
- C. Miscellaneous Rolled Components:
  - 1. Subgirts: C- or Z-shaped sections fabricated from 0.0598-inch (1.5-mm) bare steel thickness, shop-painted, cold-formed, metallic-coated steel sheet.
  - 2. Zee Clips: 0.079-inch (2.0-mm) bare steel thickness, cold-formed, galvanized steel sheet.

3. Base or Sill Angles: 0.079-inch (2.0-mm) bare steel thickness, cold-formed, galvanized steel sheet.
  4. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
    - a. Minimum Base Metal Thickness: 0.0312 inch (0.79 mm).
    - b. Depth: As indicated.
- D. Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide exposed fasteners with heads matching color of metal wall panels by means of plastic caps or factory-applied coating.
1. Fasteners for Wall Panels: Self-drilling or self-tapping 410 stainless or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal wall panels.
  2. Fasteners for Flashing and Trim: Blind fasteners or self-drilling screws with hex washer head.
  3. Blind Fasteners: High-strength aluminum or stainless-steel rivets.
- E. Sealing Tape: Pressure-sensitive 100 percent solids polyisobutylene compound sealing tape with release paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
- F. Joint Sealant: One-part silicone rubber sealant as recommended by the manufacturer.
- G. Bituminous Coating: Cold-applied asphalt mastic, SSPC paint 12, compounded for dry film thickness of 15 mils per coat.

#### 2.4 PANEL FABRICATION

- A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
1. Fabricate wall panels with panel stiffeners as required to maintain fabrication tolerances and to withstand design loads.
- B. Fabricate panel joints with captive gaskets or separator strips, which provide a tight seal and prevent metal-to-metal contact in a manner that will minimize noise from movements within panel system.
- C. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
  2. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
  3. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
  4. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
  5. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
    - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

## 2.6 FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- C. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in the same piece are not acceptable. Variations in appearance of other components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
- D. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions
  - 1. Fluoropolymer Three-Coat System: Manufacturer's standard three-coat, thermocured system consisting of specially formulated inhibitive primer, fluoropolymer color coat, and clear fluoropolymer topcoat, with both color coat and clear topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight, with a minimum total dry film thickness of 2.4 mil (0.061 mm); complying with physical properties and coating performance requirements of AAMA 621, except as modified below:
    - a. Humidity Resistance: 2000 hours.
    - b. Salt-Spray Resistance: 2000 hours.
  - 2. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with a minimum total dry film thickness of 0.9 mil (0.023 mm).
  - 3. Color and Gloss: Metallic, as selected by Architect from manufacturer's full range.
  - 4. Resin Manufacturers: Subject to compliance with requirements, provide fluoropolymer coating systems containing resins produced by one of the following manufacturers:
    - a. Arkema, Inc. (Kynar 500)
    - b. Solvay Solexis, Inc. (Hylar 5000)

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of work.
  - 1. Examine primary and secondary wall framing to verify that girts, angles, channels, studs, and other structural panel support members and anchorage have been installed within alignment tolerances required by metal wall panel manufacturer.
  - 2. Examine solid wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.
- B. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.
- B. Install flashings and other sheet metal to comply with requirements specified in Division 07 Section "Sheet Metal Flashing and Trim."
- D. Miscellaneous Framing: Install subgirts, base angles, sills, furring, and other miscellaneous wall panel support members and anchorage according to ASTM C 754 and metal wall panel manufacturer's written recommendations.

### 3.3 METAL WALL PANEL INSTALLATION, GENERAL

- A. General: Install metal wall panels in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to girts and subgirts, unless otherwise indicated. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement.
  - 1. Field cutting of metal wall panels by torch is not permitted.
  - 2. Shim or otherwise plumb substrates receiving metal wall panels.
  - 3. Rigidly fasten base end of metal wall panels and allow eave end free movement due to thermal expansion and contraction. Pre-drill panels.
  - 4. Flash and seal metal wall panels with weather closures at eaves, rakes, and at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until weather barrier and flashings that will be concealed by metal wall panels are installed.
  - 5. Install screw fasteners in predrilled holes.
  - 6. Locate and space fastenings in uniform vertical and horizontal alignment.
  - 7. Install flashing and trim as metal wall panel work proceeds.
  - 8. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
  - 9. Apply elastomeric sealant continuously between metal base channel (sill angle) and concrete, and elsewhere as indicated or, if not indicated, as necessary for waterproofing.
  - 10. Align bottom of metal wall panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
  - 11. Provide weatherproof escutcheons for pipe and conduit penetrating exterior walls.
- B. Fasteners:
  - 1. Steel Wall Panels: Use stainless-steel fasteners for surfaces exposed to the exterior and galvanized steel fasteners for surfaces exposed to the interior.
- C. Joint Sealers: Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.
  - 1. Seal metal wall panel end laps with double beads of tape or sealant, full width of panel. Seal side joints where recommended by metal wall panel manufacturer.
  - 2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

### 3.4 FIELD-ASSEMBLED METAL WALL PANEL INSTALLATION

- A. Lap-Seam Metal Wall Panels: Fasten metal wall panels to supports with fasteners at each lapped joint at location and spacing recommended by manufacturer.

1. Arrange and nest side-lap joints so prevailing winds blow over, not into, lapped joints. Lap ribbed or fluted sheets one full rib corrugation. Apply panels and associated items for neat and weathertight enclosure. Avoid "panel creep" or application not true to line.
  2. Provide metal-backed washers under heads of exposed fasteners bearing on weather side of metal wall panels.
  3. Locate and space exposed fasteners in uniform vertical and horizontal alignment. Use proper tools to obtain controlled uniform compression for positive seal without rupture of washer.
  4. Install screw fasteners with power tools having controlled torque adjusted to compress washer tightly without damage to washer, screw threads, or panels. Install screws in predrilled holes.
  5. Provide sealant tape at lapped joints of metal wall panels and between panels and protruding equipment, vents, and accessories.
  6. Apply a continuous ribbon of sealant tape to weather-side surface of fastenings on end laps, and on side laps of nesting-type panels; on side laps of corrugated nesting-type, ribbed, or fluted panels; and elsewhere as needed to make panels weatherproof to driving rains.
  7. At panel splices, nest panels with minimum 6-inch (150-mm) end lap, sealed with butyl-rubber sealant and fastened together by interlocking clamping plates.
- B. Zee Clips: Provide Zee clips of size indicated or, if not indicated, as required to act as standoff from subgirts for thickness of insulation indicated. Attach to subgirts with fasteners.

### 3.5 ACCESSORY INSTALLATION

- A. General: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal wall panel assembly including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, closure strips, and similar items.
- B. Flashing and Trim: Comply with performance requirements, manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without excessive oil canning, buckling, and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in water-proof and weather-resistant performance.
  2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped or bayonet-type expansion provisions cannot be used or would not be sufficiently weather resistant and waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with mastic sealant (concealed within joints).

### 3.6 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal wall panel units within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m), nonaccumulative, on level, plumb, and location lines as indicated and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

### 3.7 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as metal wall panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal wall panel installation, clean finished surfaces as recommended by metal wall panel manufacturer.

Maintain in a clean condition during construction.

- B. After metal wall panel installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal wall panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION

SECTION 07 54 16

ETHYLENE INTERPOLYMER (KEE) ROOFING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Mechanically fastened ethylene interpolymer (KEE) roofing system.
  - 2. Vapor retarder.
  - 3. Roof insulation.
- B. Section includes the installation of insulation strips in ribs of deck. Insulation strips are furnished under Section 05 31 00 "Steel Decking."

1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

1.4 PREINSTALLATION MEETINGS

- A. Preliminary Roofing Conference: Before starting roof deck construction, conduct conference at Project site.
  - 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
  - 2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
  - 3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 4. Review deck substrate requirements for conditions and finishes, including flatness and fastening.
  - 5. Review structural loading limitations of roof deck during and after roofing.
  - 6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
  - 7. Review governing regulations and requirements for insurance and certificates if applicable.
  - 8. Review temporary protection requirements for roofing system during and after installation.
  - 9. Review roof observation and repair procedures after roofing installation.
- B. Preinstallation Roofing Conference: Conduct conference at Project site.
  - 1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing Installer, roofing system manufacturer's representative, deck Installer, and

- installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
  3. Review and finalize construction schedule, and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
  5. Review structural loading limitations of roof deck during and after roofing.
  6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that affects roofing system.
  7. Review governing regulations and requirements for insurance and certificates if applicable.
  8. Review temporary protection requirements for roofing system during and after installation.
  9. Review roof observation and repair procedures after roofing installation.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
  1. Product Data for Credit SS 7.2: For roof materials, documentation indicating that roof materials comply with Solar Reflectance Index requirement.
  2. Product Data for Credit IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
  3. Laboratory Test Reports for Credit IEQ 4.1: For adhesives and sealants used inside the weatherproofing system, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work, including:
  1. Base flashings and membrane terminations.
  2. Tapered insulation, including slopes.
  3. Roof plan showing orientation of steel roof deck and orientation of roofing and fastening spacings and patterns for mechanically fastened roofing.
  4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.
- D. Samples for Verification: For the following products:
  1. Sheet roofing, of color required.
  2. Walkway pads or rolls, of color required.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.
- B. Manufacturer Certificates: Signed by roofing manufacturer certifying that roofing system complies with requirements specified in "Performance Requirements" Article.
  1. Submit evidence of compliance with performance requirements.
- C. Product Test Reports: For components of roofing system, tests performed by manufacturer and witnessed by a qualified testing agency.

- D. Research/Evaluation Reports: For components of roofing system, from ICC-ES.
- E. Field quality-control reports.
- F. Sample Warranties: For manufacturer's special warranties.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roofing system to include in maintenance manuals.

#### 1.8 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is UL listed or FM Global approved for roofing system identical to that used for this Project.
- B. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, approval or listing agency markings, and directions for storing and mixing with other components.
- B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.
  - 1. Discard and legally dispose of liquid material that cannot be applied within its stated shelf life.
- C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.
- D. Handle and store roofing materials, and place equipment in a manner to avoid permanent deflection of deck.

#### 1.10 FIELD CONDITIONS

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

#### 1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
  - 1. Special warranty includes membrane roofing, base flashings, roof insulation, fasteners, roofing accessories, and other components of roofing system.
  - 2. Warranty Period: 15 years from date of Substantial Completion.

- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as membrane roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:

- 1. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis of Design: Design is based on "50 Mil FiberTite-XT as manufactured by Seaman Corporation. Provide basis of design product, or comparable product approved by Architect.
- B. Source Limitations: Obtain components including roof insulation and fasteners for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
  - 1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
  - 2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. FM Global Listing: Roofing, base flashings, and component materials shall comply with requirements in FM Global 4450 or FM Global 4470 as part of a built-up roofing system, and shall be listed in FM Global's "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
  - 1. Fire/Windstorm Classification: Class 1A-90.
  - 2. Hail-Resistance Rating: SH.
- D. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
- E. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- F. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

## 2.3 KEE ROOFING

- A. KEE Sheet: ASTM D 6754/D 6754M, fabric reinforced.
  - 1. Thickness: 50 mils.
  - 2. Exposed Face Color: White.

## 2.4 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
  - 1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
  - 2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
- B. Sheet Flashing: Manufacturer's standard sheet flashing of same material, type, reinforcement, thickness, and color as KEE sheet.
- C. Bonding Adhesive: Manufacturer's standard, water based.
- D. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.
- E. Miscellaneous Accessories: Provide pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

## 2.5 ROOF INSULATION

- A. General: Preformed roof insulation boards manufactured or approved by KEE roofing manufacturer, selected from manufacturer's standard sizes suitable for application, of thicknesses indicated and that produce FM Global-approved roof insulation.
- B. Polyisocyanurate Board Insulation: ASTM C 1289, Type II, Class 1, Grade 2, felt or glass-fiber mat facer on both major surfaces.
- C. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.
- D. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

## 2.6 INSULATION ACCESSORIES

- A. General: Roof insulation accessories recommended by insulation manufacturer for intended use and compatibility with roofing.
- B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation to substrate, and acceptable to roofing system manufacturer.

## 2.7 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway rolls, approximately 3/16 inch (5 mm) thick and acceptable to roofing system manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work:
  - 1. Verify that roof openings and penetrations are in place, curbs are set and braced, and roof-drain bodies are securely clamped in place.
  - 2. Verify that wood blocking, curbs, and nailers are securely anchored to roof deck at penetrations and terminations and that nailers match thicknesses of insulation.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean substrate of dust, debris, moisture, and other substances detrimental to roofing installation according to roofing system manufacturer's written instructions. Remove sharp projections.
- B. Prevent materials from entering and clogging roof drains and conductors and from spilling or migrating onto surfaces of other construction. Remove roof-drain plugs when no work is taking place or when rain is forecast.

### 3.3 ROOFING INSTALLATION, GENERAL

- A. Install roofing system according to roofing system manufacturer's written instructions.
- B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.

### 3.4 INSULATION INSTALLATION

- A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.
- B. Comply with roofing system and insulation manufacturer's written instructions for installing roof insulation.
- C. Install tapered insulation under area of roofing to conform to slopes indicated.
- D. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.
- E. Trim surface of insulation where necessary at roof drains so completed surface is flush and does not restrict flow of water.

- F. Install insulation with long joints of insulation in a continuous straight line with end joints staggered between rows, abutting edges and ends between boards. Fill gaps exceeding 1/4 inch (6 mm) with insulation.
  - 1. Cut and fit insulation within 1/4 inch (6 mm) of nailers, projections, and penetrations.
- G. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
  - 1. Fasten insulation according to requirements in FM Global's "RoofNav" for specified Windstorm Resistance Classification.
  - 2. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

### 3.5 MECHANICALLY FASTENED MEMBRANE ROOFING INSTALLATION

- A. Mechanically fasten roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before installing.
  - 1. For in-splice attachment, install roofing with long dimension perpendicular to steel roof deck flutes.
- B. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- C. Mechanically fasten or adhere roofing securely at terminations, penetrations, and perimeter of roofing.
- D. Apply roofing with side laps shingled with slope of roof deck where possible.
- E. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
  - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
  - 2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
  - 3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.
- F. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

### 3.6 BASE FLASHING INSTALLATION

- A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
- B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
- C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
- D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
- E. Terminate and seal top of sheet flashings[ and mechanically anchor to substrate through termination bars].

### 3.7 WALKWAY INSTALLATION

- A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

### 3.8 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to inspect substrate conditions, surface preparation, membrane application, flashings, protection, and drainage components, and to furnish reports to Architect.
  - I. Electric Field Vector Mapping (EFVM): Testing agency shall survey entire roof area for potential leaks using electric field vector mapping (EFVM).
- B. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- C. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine if replaced or additional work complies with specified requirements.

### 3.9 PROTECTING AND CLEANING

- A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
- B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.

END OF SECTION 07 54 16

SECTION 07 62 00

SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Manufactured counterflashing.
  - 2. Formed low-slope roof sheet metal fabrications.
  - 3. Formed wall sheet metal fabrications.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
- C. Shop Drawings: Show installation layouts of sheet metal flashing and trim, including plans, elevations, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
  - 1. Include details for forming, joining, supporting, and securing sheet metal flashing and trim, including pattern of seams, termination points, fixed points, expansion joints, expansion-joint covers, edge conditions, special conditions, and connections to adjoining work.
- D. Samples: For each exposed product and for each finish specified.
- E. Maintenance data.
- F. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

- A. Sheet Metal Flashing and Trim Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.
- B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.

1.4 WARRANTY

- A. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within 20 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 SHEET METALS

- A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying a strippable, temporary protective film before shipping.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required.
  - 1. Clear Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
  - 2. Color Anodic Finish, Coil Coated: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
    - a. Color: Match Curtain Wall color.
- C. Metallic-Coated Steel Sheet: Restricted flatness steel sheet, metallic coated by the hot-dip process and preprimed by the coil-coating process to comply with ASTM A 755/A 755M.
  - 1. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation; structural quality.

### 2.2 UNDERLAYMENT AND FLEXIBLE FLASHING MATERIALS

- A. Underlayment Felt: ASTM D 226, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
- B. Underlayment and Flexible Flashing Material: Self-adhering, high-temperature sheet, minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by manufacturer.
  - 1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C).
  - 2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C).

### 2.3 MISCELLANEOUS MATERIALS

- A. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.
- B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.
  - 1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.
    - a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating.
    - b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.
  - 2. Fasteners for Aluminum Sheet: Aluminum or Series 300 stainless steel.
  - 3. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329 or Series 300 stainless steel.

- C. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.
- D. Elastomeric Sealant: ASTM C 920, elastomeric polymer sealant; low modulus; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.
- E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.
- F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.
- G. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

#### 2.4 FABRICATION, GENERAL

- A. General: Custom fabricate sheet metal flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, geometry, metal thickness, and other characteristics of item indicated. Fabricate items at the shop to greatest extent possible.
  - 1. Obtain field measurements for accurate fit before shop fabrication.
  - 2. Form sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.
  - 3. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces exposed to view.
- B. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant.
- C. Expansion Provisions: Where lapped expansion provisions cannot be used, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.
- D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.
- E. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.
- F. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use.
- G. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer.

#### 2.5 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

- A. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 10-foot- (3-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, seal, and solder or weld watertight. Fabricate from the following materials:
  - 1. Aluminum: 0.050 inch (1.27 mm) thick.
  - 2. Galvanized Steel: 0.040 inch (1.02 mm) thick.
- B. Base Flashing: Fabricate from the following materials:

1. Aluminum: 0.040 inch (1.02 mm) thick.
  2. Galvanized Steel: 0.028 inch (0.71 mm) thick.
- C. Counterflashing: Fabricate from the following materials:
1. Aluminum: 0.032 inch (0.81 mm) thick.
  2. Galvanized Steel: 0.022 inch (0.56 mm) thick.

## PART 3 - EXECUTION

### 3.1 UNDERLAYMENT INSTALLATION

- A. Felt Underlayment: Install felt underlayment with adhesive for temporary anchorage. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).
- B. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Comply with temperature restrictions of underlayment manufacturer for installation; use primer rather than nails for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.

### 3.2 INSTALLATION, GENERAL

- A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement so that completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight. Use fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.
1. Install sheet metal flashing and trim true to line and levels indicated. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.
  2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.
  3. Space cleats not more than 12 inches (300 mm) apart. Anchor each cleat with two fasteners. Bend tabs over fasteners.
  4. Install exposed sheet metal flashing and trim without excessive oil canning, buckling, and tool marks.
  5. Install sealant tape where indicated.
  6. Torch cutting of sheet metal flashing and trim is not permitted.
- B. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by SMACNA.
1. Coat back side of uncoated aluminum sheet metal flashing and trim with bituminous coating where flashing and trim will contact wood, ferrous metal, or cementitious construction.
  2. Underlayment: Where installing metal flashing directly on cementitious or wood substrates, install a course of felt underlayment and cover with a slip sheet or install a course of polyethylene sheet.
- C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet (3 m) with no joints allowed within 24 inches (600 mm) of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently watertight, form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.

- D. Fastener Sizes: Use fasteners of sizes that will penetrate metal decking not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.
- E. Seal joints as shown and as required for watertight construction.
- F. Rivets: Rivet joints in uncoated aluminum where indicated and where necessary for strength.

### 3.3 ROOF FLASHING INSTALLATION

- A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer's written installation instructions, and SMACNA's "Architectural Sheet Metal Manual." Provide concealed fasteners where possible, set units true to line, and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate at staggered 3-inch (75-mm) centers.
- C. Copings: Anchor to resist uplift and outward forces according to recommendations in SMACNA's "Architectural Sheet Metal Manual" and as indicated.
- D. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints a minimum of 4 inches (100 mm) and bed with sealant.
- E. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric sealant and clamp flashing to pipes that penetrate roof.

### 3.4 WALL FLASHING INSTALLATION

- A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations and as indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

### 3.5 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.
- B. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer's written installation instructions.

END OF SECTION 07 62 00

SECTION 07 72 00  
ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY

- A. This Section includes the following:
  - 1. Roof hatches.

1.2 SUBMITTALS

- A. Product Data: For each type of roof accessory indicated.
- B. Shop Drawings: Show fabrication and installation details for roof accessories.
- C. Samples: For each type of exposed factory-applied finish required and for each type of roof accessory indicated, prepared on Samples of size to adequately show color.

1.3 QUALITY ASSURANCE

- A. Sheet Metal Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.

PART 2 - PRODUCTS

2.1 METAL MATERIALS

- A. Prepainted, Metallic-Coated Steel Sheet: Steel sheet metallic coated by hot-dip process and prepainted by coil-coating process to comply with ASTM A 755/A 755M.
  - 1. Galvanized Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coated.
  - 2. Exposed Finishes: Manufacturer's standard 2-coat, thermocured system consisting of specially formulated inhibitive primer and fluoropolymer color topcoat containing not less than 70 percent polyvinylidene fluoride resin by weight.

2.2 ROOF HATCHES

- A. Roof Hatches: Fabricate roof hatches with insulated double-wall lids and insulated double-wall curb frame with integral deck mounting flange and lid frame counterflashing. Fabricate with welded or mechanically fastened and sealed corner joints. Provide continuous weathertight perimeter gasketing and equip with corrosion-resistant or hot-dip galvanized hardware.
  - 1. Available Manufacturers:
    - a. Babcock-Davis; a Cierra Products Inc. Company.
    - b. Bilco Company (The).
    - c. J. L. Industries, Inc.

- d. Metallic Products Corporation.
  - e. Milcor Inc.; a Gibraltar Company.
2. Loads: Fabricate roof hatches to withstand 40-lbf/sq. ft. (1.9-kPa) external and 20-lbf/sq. ft. (0.95-kPa) internal loads.
  3. Type and Size: Single-leaf lid, 30 by 36 inches (750 by 900 mm).
  4. Curb and Lid Material: Galvanized steel sheet, 0.079 inch (2.0 mm) thick.
    - a. Finish: High-performance organic coating.
  5. Insulation: Glass-fiber board.
  6. Interior Lid Liner: Manufacturer's standard metal liner of same material and finish as outer metal lid.
  7. Exterior Curb Liner: Manufacturer's standard metal liner of same material and finish as metal curb.
  8. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
  9. Fabricate units to minimum height of 12 inches (300 mm), unless otherwise indicated.
  10. Sloping Roofs: Where slope or roof deck exceeds 1:48, fabricate hatch curbs with height constant.
  11. Hardware: Stainless-steel spring latch with turn handles, butt- or pintle-type hinge system, and padlock hasps inside and outside.
    - a. Provide 2-point latch on covers larger than 84 inches (2130 mm).
    - b. Provide remote-control operation.
  12. Safety Railing System: Roof-hatch manufacturer's standard system including rails, clamps, fasteners, safety barrier at railing opening, and accessories required for a complete installation; attached to roof hatch and complying with 29 CFR 1910.23 requirements and authorities having jurisdiction.
  13. Ladder Safety Post: Manufacturer's standard ladder safety post. Post to lock in place on full extension. Provide release mechanism to return post to closed position.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Install roof accessories according to manufacturer's written instructions. Anchor roof accessories securely in place and capable of resisting forces specified. Use fasteners, separators, sealants, and other miscellaneous items as required for completing roof accessory installation. Install roof accessories to resist exposure to weather without failing, rattling, leaking, and fastener disengagement.
- B. Install roof accessories to fit substrates and to result in watertight performance.
- C. Metal Protection: Where dissimilar metals will contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.
- D. Install roof accessories level, plumb, true to line and elevation, and without warping, jogs in alignment, excessive oil canning, buckling, or tool marks.
- E. Seal joints with elastomeric sealant as required by manufacturer of roof accessories.

END OF SECTION 07 72 00

ROOF ACCESSORIES

07 72 00 - 2

SECTION 07 81 00

APPLIED FIREPROOFING

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. Concealed SFRM.

- B. Related Sections include the following:

- 1. Division 05 Section "Structural Steel Framing" for corrosion resistant priming surface conditions required for structural steel receiving SFRM.

1.3 DEFINITIONS

- A. SFRM: Sprayed fire-resistive material.

- B. Concealed: Fire-resistive materials applied to surfaces that are concealed from view behind other construction when the Work is completed.

1.4 SUBMITTALS

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

- B. LEED Submittals:

- 1. Product Data for Credit EQ 4.2: For paints and coatings, documentation including printed statement of VOC content.

- C. Compatibility and Adhesion Test Reports: From SFRM manufacturer indicating the following:

- 1. Materials have been verified by SFRM manufacturer to be compatible with substrate primers and coatings.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

- D. Research/Evaluation Reports: For SFRM.

- E. Field quality-control test and special inspection reports.

- F. Warranties: Special warranties specified in this Section.

## 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by SFRM manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements. A manufacturer's willingness to sell its SFRM to Contractor or to an installer engaged by Contractor does not in itself confer qualification on the buyer.
- B. Source Limitations: Obtain SFRM through one source from a single manufacturer.
- C. SFRM Testing: By a qualified testing and inspecting agency engaged by Contractor or manufacturer to test for compliance with specified requirements for performance and test methods.
  - 1. SFRMs are randomly selected for testing from bags bearing the applicable classification marking of UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
  - 2. Testing is performed on specimens of SFRMs that comply with laboratory testing requirements specified in Part 2 and are otherwise identical to installed fire-resistive materials, including application of accelerant, sealers, topcoats, tamping, troweling, rolling, and water overspray, if any of these are used in final application.
  - 3. Testing is performed on specimens whose application the independent testing and inspecting agency witnessed during preparation and conditioning. Include in test reports a full description of preparation and conditioning of laboratory test specimens.
- D. Compatibility and Adhesion Testing: Engage a qualified testing and inspecting agency to test for compliance with requirements for specified performance and test methods.
  - 1. Test for bond per ASTM E 736 and requirements in UL's "Fire Resistance Directory" for coating materials. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
  - 2. Verify that manufacturer, through its own laboratory testing or field experience, has not found primers or coatings to be incompatible with SFRM.
- E. Fire-Test-Response Characteristics: Provide SFRM with the fire-test-response characteristics indicated, as determined by testing identical products per test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction. Identify bags containing SFRM with appropriate markings of applicable testing and inspecting agency.
  - 1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency acceptable to authorities having jurisdiction, for SFRM serving as direct-applied protection tested per ASTM E 119.
  - 2. Surface-Burning Characteristics: ASTM E 84.
- F. Provide products containing no detectable asbestos as determined according to the method specified in 40 CFR 763, Subpart E, Appendix E, Section 1, "Polarized Light Microscopy."

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in original, unopened packages with intact and legible manufacturers' labels identifying product and manufacturer, date of manufacture, shelf life if applicable, and fire-resistance ratings applicable to Project.
- B. Use materials with limited shelf life within period indicated. Remove from Project site and discard materials whose shelf life has expired.
- C. Store materials inside, under cover, and aboveground; keep dry until ready for use. Remove from Project site and discard wet or deteriorated materials.

## 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not apply SFRM when ambient or substrate temperature is 40 deg F (4 deg C) or lower unless temporary protection and heat are provided to maintain temperature at or above this level for 24 hours before, during, and for 24 hours after product application.
- B. Ventilation: Ventilate building spaces during and after application of SFRM. Use natural means or, if they are inadequate, forced-air circulation until fire-resistive material dries thoroughly.

## 1.8 COORDINATION

- A. Sequence and coordinate application of SFRM with other related work specified in other Sections to comply with the following requirements:
  - 1. Provide temporary enclosure as required to confine spraying operations and protect the environment.
  - 2. Provide temporary enclosures for applications to prevent deterioration of fire-resistive material due to exposure to weather and to unfavorable ambient conditions for humidity, temperature, and ventilation.
  - 3. Avoid unnecessary exposure of fire-resistive material to abrasion and other damage likely to occur during construction operations subsequent to its application.
  - 4. Do not apply fire-resistive material to metal roof deck substrates until concrete topping, if any, has been completed. For metal roof decks without concrete topping, do not apply fire-resistive material to metal roof deck substrates until roofing has been completed; prohibit roof traffic during application and drying of fire-resistive material.
  - 5. Do not apply fire-resistive material to metal floor deck substrates until concrete topping has been completed.
  - 6. Do not begin applying fire-resistive material until clips, hangers, supports, sleeves, and other items penetrating fire protection are in place.
  - 7. Defer installing ducts, piping, and other items that would interfere with applying fire-resistive material until application of fire protection is completed.
  - 8. Do not install enclosing or concealing construction until after fire-resistive material has been applied, inspected, and tested and corrections have been made to defective applications.

## 1.9 WARRANTY

- A. Special Warranty: Manufacturer's standard form, signed by Contractor and by Installer, in which manufacturer agrees to repair or replace SFRMs that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Cracking, flaking, spalling, or eroding in excess of specified requirements; peeling; or delaminating of SFRM from substrates.
    - b. Not covered under the warranty are failures due to damage by occupants and Owner's maintenance personnel, exposure to environmental conditions other than those investigated and approved during fire-response testing, and other causes not reasonably foreseeable under conditions of normal use.
  - 2. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 CONCEALED SFRM

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:
1. Concealed Cementitious SFRM:
    - a. Carbolite Co., Fireproofing Products Div.; Pyrolite 15 High Yield.
    - b. Grace, W. R. & Co. - Conn., Construction Products Div.; Monokote Type MK-6/HY and MK-6s.
    - c. Isolatek International Corp.; Cafco 300.
- B. Material Composition: Manufacturer's standard product, as follows:
1. Concealed Cementitious SFRM: Factory-mixed, dry formulation of gypsum or portland cement binders, additives, and lightweight mineral or synthetic aggregates mixed with water at Project site to form a slurry or mortar for conveyance and application.
- C. Physical Properties: Minimum values, unless otherwise indicated, or higher values required to attain designated fire-resistance ratings, measured per standard test methods referenced with each property as follows:
1. Dry Density: 15 lb/cu. ft. (240 kg/cu. m) for average and individual densities, or greater if required to attain fire-resistance ratings indicated, per ASTM E 605 or AWCI Technical Manual 12-A, Section 5.4.5, "Displacement Method."
  2. Thickness: Minimum average thickness required for fire-resistance design indicated according to the following criteria, but not less than 0.375 inch (9 mm), per ASTM E 605:
    - a. Where the referenced fire-resistance design lists a thickness of 1 inch (25 mm) or more, the minimum allowable individual thickness of SFRM is the design thickness minus 0.25 inch (6 mm).
    - b. Where the referenced fire-resistance design lists a thickness of less than 1 inch (25 mm) but more than 0.375 inch (9 mm), the minimum allowable individual thickness of SFRM is the greater of 0.375 inch (9 mm) or 75 percent of the design thickness.
    - c. No reduction in average thickness is permitted for those fire-resistance designs whose fire-resistance ratings were established at densities of less than 15 lb/cu. ft. (240 kg/cu. m).
  3. Bond Strength: 150 lbf/sq. ft. (7.2 kPa) minimum per ASTM E 736 based on laboratory testing of 0.75-inch (19-mm) minimum thickness of SFRM.
  4. Compressive Strength: 1200 psf (57 kPa) minimum per ASTM E 761. Minimum thickness of SFRM tested shall be 0.75 inch (19 mm) and minimum dry density shall be as specified but not less than 15 lb/cu. ft. (240 kg/cu. m).
  5. Corrosion Resistance (ASTM E 937): Does not promote corrosion.
  6. Deflection: No cracking, spalling, or delamination per ASTM E 759.
  7. Effect of Impact on Bonding: No cracking, spalling, or delamination per ASTM E 760.
  8. Air Erosion: Maximum weight loss of 0.025 g/sq. ft. (0.270 g/sq. m) in 24 hours per ASTM E 859. For laboratory tests, minimum thickness of SFRM is 0.75 inch (19 mm), maximum dry density is 15 lb/cu. ft. (240 kg/cu. m), test specimens are not prepurged by mechanically induced air velocities, and tests are terminated after 24 hours.
  9. Fire-Test-Response Characteristics: Provide SFRM with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
    - a. Flame-Spread Index: 10 or less.
    - b. Smoke-Developed Index: 0.

10. Fungal Resistance: No observed growth on specimens per ASTM G 21.

## 2.2 AUXILIARY FIRE-RESISTIVE MATERIALS

- A. General: Provide auxiliary fire-resistive materials that are compatible with SFRM and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction and the following VOC limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - 1. Flat Paints and Coatings: 50 g/L.
  - 2. Nonflat Paints and Coatings: 150 g/L.
  - 3. Primers, Sealers, and Undercoaters: 200 g/L.
  - 4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of work. A substrate is in satisfactory condition if it complies with the following:
  - 1. Substrates comply with requirements in the Section where the substrate and related materials and construction are specified.
  - 2. Substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, incompatible paints, incompatible encapsulants, or other foreign substances capable of impairing bond of fire-resistive materials with substrates under conditions of normal use or fire exposure.
  - 3. Objects penetrating fire-resistive material, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.
  - 4. Substrates are not obstructed by ducts, piping, equipment, and other suspended construction that will interfere with applying fire-resistive material.
- B. Verify that concrete work on steel deck has been completed.
- C. Verify that roof construction, installation of roof-top HVAC equipment, and other related work are completed.
- D. Conduct tests according to fire-resistive material manufacturer's written recommendations to verify that substrates are free of substances capable of interfering with bond.
- E. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Cover other work subject to damage from fallout or overspray of fire-resistive materials during application.
- B. Clean substrates of substances that could impair bond of fire-resistive material, including dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, and incompatible primers, paints, and encapsulants.

- C. Prime substrates where recommended in writing by SFRM manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive SFRM.
- D. For exposed applications, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of SFRM. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

### 3.3 APPLICATION, GENERAL

- A. Comply with fire-resistive material manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and spray on fire-resistive material, as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- B. Apply SFRM that is identical to products tested as specified in Part 1 "Quality Assurance" Article and substantiated by test reports, with respect to rate of application, accelerator use, sealers, topcoats, tamping, troweling, water overspray, or other materials and procedures affecting test results.
- C. Extend fire-resistive material in full thickness over entire area of each substrate to be protected. Unless otherwise recommended in writing by SFRM manufacturer, install body of fire-resistive covering in a single course.
- D. Spray apply fire-resistive materials to maximum extent possible. Following the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by SFRM manufacturer.
- E. For applications over encapsulant materials, including lockdown (post-removal) encapsulants, apply SFRM that differs in color from that of encapsulant over which it is applied.

### 3.4 APPLICATION, CONCEALED SFRM

- A. Apply concealed SFRM in thicknesses and densities not less than those required to achieve fire-resistance ratings designated for each condition, but apply in greater thicknesses and densities if specified in Part 2 "Concealed SFRM" Article.
- B. Cure concealed SFRM according to product manufacturer's written recommendations.

### 3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspection and prepare reports:
  - 1. SFRM.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections and prepare test reports.
  - 1. Testing and inspecting agency will interpret tests and state in each report whether tested work complies with or deviates from requirements.
- C. Tests and Inspections: Testing and inspecting of completed applications of SFRM shall take place in successive stages, in areas of extent and using methods as follows. Do not proceed with application of SFRM for the next area until test results for previously completed applications of SFRM show compliance with requirements. Tested values must equal or exceed values indicated and required for approved fire-resistance design.

1. Thickness for Floor, Roof, and Wall Assemblies: For each 1000-sq. ft. (93-sq. m) area, or partial area, on each floor, from the average of 4 measurements from a 144-sq. in. (0.093-sq. m) sample area, with sample width of not less than 6 inches (152 mm) per ASTM E 605.
  2. Thickness for Structural Frame Members: From a sample of 25 percent of structural members per floor, taking 9 measurements at a single cross section for structural frame beams or girders, 7 measurements of a single cross section for joists and trusses, and 12 measurements of a single cross section for columns per ASTM E 605.
  3. Density for Floors, Roofs, Walls, and Structural Frame Members: At frequency and from sample size indicated for determining thickness of each type of construction and structural framing member, per ASTM E 605 or AWCI Technical Manual 12-A, Section 5.4.5, "Displacement Method."
  4. Bond Strength for Floors, Roofs, Walls, and Structural Framing Members: For each 10,000-sq. ft. (929 sq. m) area, or partial area, on each floor, cohesion and adhesion from one sample of size indicated for determining thickness of each type of construction and structural framing member, per ASTM E 736.
    - a. Field test SFRM that is applied to flanges of wide-flange, structural-steel members on surfaces matching those that will exist for remainder of steel receiving fire-resistive material.
    - b. Structural steel receiving SFRM shall be primed, perform series of bond tests specified in UL's "Fire Resistance Directory." Provide bond strength indicated in referenced UL fire-resistance criteria, but not less than 150 lbf/sq. ft. (7.2 kPa) minimum per ASTM E 736.
  5. If testing finds applications of SFRM are not in compliance with requirements, testing and inspecting agency will perform additional random testing to determine extent of noncompliance.
- D. Remove and replace applications of SFRM that do not pass tests and inspections for cohesion and adhesion, for density, or for both and retest as specified above.
- E. Apply additional SFRM, per manufacturer's written instructions, where test results indicate that thickness does not comply with specified requirements, and retest as specified above.

### 3.6 CLEANING, PROTECTING, AND REPAIR

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.
- B. Protect SFRM, according to advice of product manufacturer and Installer, from damage resulting from construction operations or other causes so fire protection will be without damage or deterioration at time of Substantial Completion.
- C. Coordinate application of SFRM with other construction to minimize need to cut or remove fire protection. As installation of other construction proceeds, inspect SFRM and patch any damaged or removed areas.
- D. Repair or replace work that has not successfully protected steel.

END OF SECTION 07 81 00

SECTION 07 81 23

INTUMESCENT MASTIC FIREPROOFING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes mastic and intumescent fire-resistive coatings (MIFRC).

1.2 PREINSTALLATION MEETINGS

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

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS

- A. Product certificates.
- B. Evaluation reports.
- C. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A firm or individual certified, licensed, or otherwise qualified by fireproofing manufacturer as experienced and with sufficient trained staff to install manufacturer's products according to specified requirements.
- B. Mastic and intumescent fire-resistive coatings: Shall conform to the requirements of UL assembly X649 for columns indicated.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

- A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.
- B. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 or UL 263. Identify products with appropriate markings of applicable testing agency.
  - 1. Steel members are to be considered unrestrained unless specifically noted otherwise.

- C. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction. and the following VOC limits when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  - 1. Flat Paints and Coatings: 50 g/L.
  - 2. Nonflat Paints and Coatings: 150 g/L.
  - 3. Primers, Sealers, and Undercoaters: 200 g/L.
  - 4. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
  - 5. Fireproofing Exterior Coatings: 350 g/L.
- D. Asbestos: Provide products containing no asbestos.

## 2.2 MASTIC AND INTUMESCENT FIRE-RESISTIVE COATINGS

- A. MIFRC: Manufacturer's standard, factory-mixed formulation or factory-mixed, multicomponent system consisting of intumescent base coat and topcoat, and complying with indicated fire-resistance design.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Albi Manufacturing, Division of StanChem Inc.; Albi Clad TF.
    - b. Carboline Company, subsidiary of RPM International, Fireproofing Products Div.; AD Firefilm III and Nullfire S607.
    - c. Isolatek International; Cafco SprayFilm-WB 3 and Cafco SprayFilm-WB 4.
  - 2. Products shall be waterborne.
  - 3. Application: Designated for "interior general purpose" and "conditioned interior space purpose" use by a qualified testing agency acceptable to authorities having jurisdiction.
  - 4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design.
  - 5. Surface-Burning Characteristics: Flame-spread and smoke-developed indexes of 25 and 50, respectively, or less according to ASTM E 84.
  - 6. Finish: As selected by Architect from manufacturer's standard finishes.
    - a. Color and Gloss: As selected by Architect from manufacturer's full range.

## 2.3 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that are compatible with fireproofing and substrates and are approved by UL or another testing and inspecting agency acceptable to authorities having jurisdiction for use in fire-resistance designs indicated.
- B. Substrate Primers: Primers approved by fireproofing manufacturer.
- C. Topcoat: Suitable for application over applied fireproofing; of type recommended in writing by fireproofing manufacturer for each fire-resistance design.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Cover other work subject to damage from fallout or overspray of fireproofing materials during application.

- B. Prime substrates where included in fire-resistance design and where recommended in writing by fireproofing manufacturer unless compatible shop primer has been applied and is in satisfactory condition to receive fireproofing.
- C. For applications visible on completion of Project, repair substrates to remove surface imperfections that could affect uniformity of texture and thickness in finished surface of fireproofing.

### 3.2 APPLICATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for substrates and other conditions affecting performance of the Work and according to each fire-resistance design. Verify that objects penetrating fireproofing are securely attached to substrates and that substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.
- B. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, topcoats, finishing, and other materials and procedures affecting fireproofing work.
- C. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.
- D. Finishes: Where indicated, apply fireproofing to produce the following finishes:
  - 1. Manufacturer's Standard Finishes: Finish according to manufacturer's written instructions for each finish selected.

### 3.3 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
  - 1. Test and inspect as required by the IBC, 1704.11.
- B. Fireproofing will be considered defective if it does not pass tests and inspections.
  - 1. Remove and replace fireproofing that does not pass tests and inspections, and retest.
  - 2. Apply additional fireproofing, per manufacturer's written instructions, where test results indicate insufficient thickness, and retest.
- C. Prepare test and inspection reports.

### 3.4 CLEANING AND REPAIRING

- A. Cleaning: Immediately after completing spraying operations in each containable area of Project, remove material overspray and fallout from surfaces of other construction and clean exposed surfaces to remove evidence of soiling.
- B. Repair fireproofing damaged by other work before concealing it with other construction.
- C. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION 07 81 23

INTUMESCENT MASTIC FIREPROOFING

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SECTION 07 84 00

FIRESTOPPING

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. Penetrations in fire-resistance-rated walls.
  - 2. Penetrations in horizontal assemblies.
  - 3. Penetrations in smoke barriers.
  - 4. Joints in or between fire-resistance-rated constructions.
  - 5. Joints at exterior perimeter-wall/floor intersections.
  - 6. Joints in smoke barriers.

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
  - 1. Product Data for Credit IEQ 4.1: For firestopping system sealants, documentation including printed statement of VOC content.
- C. Product Schedule: For each firestopping system. Include location, illustration of firestopping system, and design designation of qualified testing agency.
  - 1. Engineering Judgments: Where Project conditions require modification to a qualified testing agency's illustration for a particular firestopping system condition, submit illustration, with modifications marked, approved by firestopping system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.
- D. Qualification Data: For Fire Stopping contractor.
- E. Product Test Reports: For each firestopping system, for tests performed by a qualified testing agency.

1.5 CLOSEOUT SUBMITTALS

- A. Installer Certificates: From Installer indicating that firestopping systems have been installed in compliance with requirements and manufacturer's written instructions.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements," and complies with the following:
  - 1. Not less than 3-years experience with complete fire stop installations.
  - 2. Successfully completed not less than 3 comparable scale projects using similar systems.

## 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install firestopping systems when ambient or substrate temperatures are outside limits permitted by firestopping system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.
- B. Install and cure firestopping systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

## 1.8 COORDINATION

- A. Coordinate construction of joints to ensure that firestopping systems can be installed according to specified firestopping system design.
- B. Coordinate sizing of joints to accommodate firestopping systems.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics:
  - 1. Perform firestopping system tests by a qualified testing agency acceptable to authorities having jurisdiction.
  - 2. Test per testing standards referenced in "Firestopping Systems" Article. Provide rated systems complying with the following requirements:
    - a. Joint firestopping systems shall bear classification marking of a qualified testing agency.
      - 1) UL in its "Fire Resistance Directory."
      - 2) Intertek Group in its "Directory of Listed Building Products."
      - 3) FM Global in its "Building Materials Approval Guide."

### 2.2 FIRESTOPPING SYSTEMS

- A. Firestopping Systems: Systems that resist spread of fire, passage of smoke and other gases, and maintain original fire-resistance rating of assemblies in or between which firestopping systems are installed. firestopping systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Hilti, Inc.
  - 2. Specified Technologies, Inc.

- C. Penetrations in Fire-Resistance-Rated Walls: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
  - 1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.
- D. Penetrations in Horizontal Assemblies: Penetration firestopping systems with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).
  - 1. F-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated.
  - 2. T-Rating: At least one hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.
  - 3. W-Rating: Provide penetration firestopping systems showing no evidence of water leakage when tested according to UL 1479.
- E. Penetrations in Smoke Barriers: Penetration firestopping systems with ratings determined per UL 1479, based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).
  - 1. L-Rating: Not exceeding 5.0 cfm/sq. ft. (0.025 cu. m/s per sq. m) of penetration opening at and no more than 50-cfm (0.024-cu. m/s) cumulative total for any 100 sq. ft. (9.3 sq. m) at both ambient and elevated temperatures.
- F. Exposed Penetration Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, per ASTM E 84.
- G. Joints in or between Fire-Resistance-Rated Construction: Provide firestopping systems with ratings determined per ASTM E 1966 or UL 2079.
  - 1. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of the wall, floor, or roof in or between which it is installed.
- H. Joints at Exterior Curtain-Wall/Floor Intersections: Provide joint firestopping systems with rating determined per ASTM E 2307.
  - 1. F-Rating: Equal to or exceeding the fire-resistance rating of the floor assembly.
- I. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079 based on testing at a positive pressure differential of 0.30-inch wg (74.7 Pa).
  - 1. L-Rating: Not exceeding 5.0 cfm/ft. (0.00775 cu. m/s x m) of joint at both ambient and elevated temperatures.
- J. Exposed Joint Firestopping Systems: Flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.
- K. VOC Content: Fire-resistive sealants shall comply with the following limits for VOC content:
  - 1. Architectural Sealants: 250 g/L.
  - 2. Sealant Primers for Nonporous Substrates: 250 g/L.
  - 3. Sealant Primers for Porous Substrates: 775 g/L.
- L. Accessories: Provide components for each firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by firestopping system manufacturer and approved by qualified testing and inspecting agency for conditions indicated.
  - 1. Permanent forming/damming/backing materials.
  - 2. Substrate primers.
  - 3. Collars.
  - 4. Steel sleeves.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

- A. Surface Cleaning: Before installing firestopping systems, clean joints and openings immediately to comply with firestopping system manufacturer's written instructions and the following requirements:
  - 1. Remove foreign materials that could interfere with adhesion of elastomeric fill materials or compromise fire-resistive rating.
  - 2. Clean substrates to produce clean, sound surfaces capable of developing optimum bond with elastomeric fill materials. Remove loose particles remaining from cleaning operation.
  - 3. Remove laitance and form-release agents from concrete.
- B. Prime substrates where recommended in writing by firestopping system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

### 3.3 INSTALLATION

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

### 3.4 IDENTIFICATION

- A. Joint Identification: Identify joint firestopping systems with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of joint edge so labels are visible to anyone seeking to remove or joint firestopping system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  - 1. The words "Warning - Joint Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
  - 2. Contractor's name, address, and phone number.
  - 3. Designation of applicable testing agency.
  - 4. Date of installation.
  - 5. Manufacturer's name.
  - 6. Installer's name.
  
- B. Wall Identification: Permanently label walls containing penetration firestopping systems with the words "FIRE AND/OR SMOKE BARRIER - PROTECT ALL OPENINGS," using lettering not less than 3 inches (76 mm) high and with minimum 0.375-inch (9.5-mm) strokes.
  - 1. Locate in accessible concealed floor, floor-ceiling, or attic space at 15 feet (4.57 m) from end of wall and at intervals not exceeding 30 feet (9.14 m).
  
- C. Penetration Identification: Identify each penetration firestopping system with legible metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of penetration firestopping system edge so labels are visible to anyone seeking to remove penetrating items or firestopping systems. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:
  - 1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."
  - 2. Contractor's name, address, and phone number.
  - 3. Designation of applicable testing and inspecting agency.
  - 4. Date of installation.
  - 5. Manufacturer's name.
  - 6. Installer's name.

### 3.5 FIELD QUALITY CONTROL

- A. Inspecting Agency: Engage a qualified testing agency to perform tests and inspections according to ASTM E 2393.
  
- B. Where deficiencies are found or firestopping systems are damaged or removed due to testing, repair or replace firestopping systems so they comply with requirements.
  
- C. Proceed with enclosing firestopping systems with other construction only after inspection reports are issued and installations comply with requirements.

### 3.6 CLEANING AND PROTECTION

- A. Clean off excess elastomeric fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by firestopping system manufacturers and that do not damage materials in which joints occur.
  
- B. Provide final protection and maintain conditions during and after installation that ensure firestopping systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration

occurs despite such protection, cut out and remove damaged or deteriorated firestopping systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 07 84 00

SECTION 07 92 00

JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes sealants for interior and exterior, vertical, horizontal, and traffic-bearing joints. The Schedule at the end of this section specifies the type of sealant used for each joint:

- 1. Silicone joint sealants
- 2. Polyurethane joint sealants.
- 3. Exterior and interior polyurethane traffic sealants.
- 4. Interior latex sealants.
- 5. Interior silicone food contact sealants.
- 6. Interior sanitary silicone sealants.
- 7. Metal lap joint sealants.
- 8. Threshold and sheet metal bedding sealants.
- 9. Joint accessories.

- B. Related Sections:

- 1. Section 08 80 00 "Glazing" for glazing sealants.
- 2. Section 09 30 00 "Tiling" for sealing tile joints.

1.3 ACTION SUBMITTALS

- A. Product Data: For each joint-sealant product indicated.

- B. LEED Submittals:

- 1. Product Data for Credit IEQ 4.1: For sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.

- C. Joint-Sealant Schedule: Proposed joint sealant for each condition indicated. Include the following information:

- 1. Joint-sealant application, joint location, and designation.
- 2. Joint-sealant manufacturer and product name.
- 3. Joint-sealant formulation.
- 4. Joint-sealant color.

- D. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

- E. Samples for Verification: For each kind and color of joint sealant required, provide Samples with joint sealants in 1/2-inch- (13-mm-) wide joints formed between two 6-inch- (150-mm-) long strips of material matching the appearance of exposed surfaces adjacent to joint sealants.

- F. Operation and Maintenance Data:
  - 1. Submit recommended inspection intervals.
  - 2. Submit instructions for repairing and replacing failed sealant joints.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.
- C. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:
  - 1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
  - 2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.
- D. Warranties: Sample of special warranties.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.
- C. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.
- D. Pre-construction testing is not required provided sealant manufacturer can furnish data acceptable to Architect based on previous testing for materials matching those of the Work.

#### 1.6 PROJECT CONDITIONS

- A. Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer.
  - 2. When joint substrates are wet.
  - 3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
  - 4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

#### 1.7 WARRANTY

- A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.
  1. Warranty Period: Insert number years from date of Substantial Completion.
- C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:
  1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
  2. Disintegration of joint substrates from natural causes exceeding design specifications.
  3. Mechanical damage caused by individuals, tools, or other outside agents.
  4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.
- B. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
  1. Architectural Sealants: 250 g/L.
  2. Sealant Primers for Nonporous Substrates: 250 g/L.
  3. Sealant Primers for Porous Substrates: 775 g/L.
- C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.
  1. Suitability for Immersion in Liquids. Where sealants are indicated for Use I for joints that will be continuously immersed in liquids, provide products that have undergone testing according to ASTM C 1247. Liquid used for testing sealants is deionized water, unless otherwise indicated.
- D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.
- E. Suitability for Contact with Food: Where sealants are indicated for joints that will come in repeated contact with food, provide products that comply with 21 CFR 177.2600.
- F. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

### 2.2 ACOUSTICAL JOINT SEALANTS

- A. Acoustical Joint Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex sealant complying with ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and

openings in building construction as demonstrated by testing representative assemblies according to ASTM E 90.

### 2.3 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin).
  - 1. Type O (open-cell material), or Type B (bicellular material with a surface skin) may be use if approved in writing by joint-sealant manufacturer for joint application indicated.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

### 2.4 MISCELLANEOUS MATERIALS

- A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
- B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.
- C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:
  - 1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
  - 2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by

vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

- a. Concrete.
  - b. Unglazed surfaces of ceramic tile.
  - c. Exterior insulation and finish systems (EIFS).
3. Remove laitance and form-release agents from concrete.
  4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:
    - a. Metal.
    - b. Glass.
    - c. Porcelain enamel.
    - d. Glazed surfaces of ceramic tile.
- B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.
- C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

### 3.3 INSTALLATION OF JOINT SEALANTS

- A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  1. Do not leave gaps between ends of sealant backings.
  2. Do not stretch, twist, puncture, or tear sealant backings.
  3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  1. Place sealants so they directly contact and fully wet joint substrates.
  2. Completely fill recesses in each joint configuration.
  3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads

of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
  - a. Use masking tape to protect surfaces adjacent to recessed tooled joints.

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

### 3.4 CLEANING

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

### 3.5 PROTECTION

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

### 3.6 JOINT-SEALANT SCHEDULE APPLICATION

A. The following joint sealant schedules are general requirements. The schedule cannot address variable environmental issues present at the time of installation (such as season of the year, dust conditions, temperature extremes, UV exposure, pollution, etc.). Determine additional physical properties for selection of proper sealant for each joint condition encountered. Submit sealant recommendations as a schedule in accordance with part 1 of this Section.

### 3.7 EXTERIOR VERTICAL JOINT-SEALANT SCHEDULE

A. Joint Locations: Perimeters of exterior openings where frames meet exterior finish (i.e., precast), joints between different exterior materials, other exterior joints in vertical surfaces and non-traffic horizontal surfaces for which no other sealant is specified.

1. Type: M (multicomponent) or S (single component).
2. Grade: NS (nonsag).
3. Class: 25 or class 50.
4. Use Related to Exposure: NT (non-traffic).
5. Uses Related to Joint Substrates: M, G, A and O as applicable to joint substrates indicated.
6. Other Characteristics: matte finish.
7. Acceptable Sealant Chemistry:
  - a. Multi-Component Urethane Sealants
  - b. Single Component Urethane Sealants
  - c. Multi-Component Silicone Sealants

d. Single Component Silicone Sealants

B. Joint Locations: Vertical expansion and control joints in cast-in-place concrete or in Architectural precast concrete units:

1. Type: M (multicomponent) or S (single component).
2. Grade: NS (nonsag).
3. Class: 100/50.
4. Use Related to Exposure: NT (non-traffic).
5. Uses Related to Joint Substrates: M, G, A and O as applicable to joint substrates indicated.
6. Acceptable Sealant Chemistry:
  - a. Multi-Component Urethane Sealants
  - b. Single Component Urethane Sealants
  - c. Multi-Component Silicone Sealants
  - d. Single Component Silicone Sealants

C. Joint Locations: Expansion and control joints in Architectural Composite Metal Panels:

1. Type: M (multicomponent) or S (single component).
2. Grade: NS (nonsag).
3. Class: 50.
4. Use Related to Exposure: NT (non-traffic).
5. Uses Related to Joint Substrates: M, G, A and O as applicable to joint substrates indicated.
6. Other Characteristics: Non-staining and Non-bleeding.
7. Acceptable Sealant Chemistry:
  - a. Multi-Component Urethane Sealants
  - b. Single Component Urethane Sealants
  - c. Multi-Component Silicone Sealants
  - d. Single Component Silicone Sealants

D. Joint Locations:

1. Horizontal Traffic Sealant Joints:
  - a. Control, expansion and isolation joints in cast-in-place concrete.
  - b. Control, expansion and isolation joints in structural precast concrete units.
  - c. Joints between architectural precast concrete paving units.
  - d. Tile control and expansion joints.
  - e. Joints between different materials listed above.
  - f. Other interior and exterior traffic bearing joints in horizontal and sloped traffic surfaces.
2. Type: M (multicomponent) or S (single component).
3. Grade: P (Pourable).
4. Class: 25 or 50.
5. Use Related to Exposure: T (traffic).
6. Uses Related to Joint Substrates: M, A and O as applicable to joint substrates indicated.
7. Other Characteristics: Self-Leveling.
8. Acceptable Sealant Chemistry:
  - a. Multi Component Urethane Sealants.
  - b. Single Component Urethane Sealants.
  - c. Single Component Pourable Neutral-Curing Silicone Sealants.

E. Joint Locations: Horizontal joints in precast, cast-in-place concrete, or unit pavers:

1. Type: M (multicomponent) or S (single component).

2. Grade: P (Pourable).
3. Class: 50 or 100/50.
4. Use Related to Exposure: T (traffic).
5. Uses Related to Joint Substrates: M, A and O as applicable to joint substrates indicated.
6. Other Characteristics: Self-Leveling.
7. Acceptable Sealant Chemistry:
  - a. Multi Component Urethane Sealants.
  - b. Single Component Urethane Sealants.
  - c. Single Component Pourable Neutral-Curing Silicone Sealants.

F. Joint Sealant Application: Concealed Metal Lap Sealant Joint:

1. Locations:
  - a. Concealed lap and hook joints in sheet metal flashing and trim.
2. Single Component Non-Curing Sealants
3. Acceptable Sealant Chemistry:
  - a. Butyl-Rubber-Based Joint Sealant: ASTM C 1311.

### 3.8 INTERIOR JOINT SCHEDULE

A. Joint Locations:

1. Interior Sealant Joint in vertical surfaces and non-traffic horizontal surfaces:
  - a. Control and expansion joints on exposed interior surfaces of exterior walls.
  - b. Perimeter joints on exposed interior surfaces of exterior openings.
  - c. Perimeter joints between interior wall surfaces and frames of interior doors, windows, storefronts, louvers, elevator entrances and similar openings.
  - d. Other interior joints in vertical surfaces and non-traffic horizontal surfaces subject to movement for which no other sealant is specified.
2. Type: S (single component).
3. Grade: NS (nonsag).
4. Class: 25.
5. Use Related to Exposure: NT (non-traffic).
6. Uses Related to Joint Substrates: M, G, A and O as applicable to joint substrates indicated.
7. Other Characteristics: Paintable.
8. Acceptable Sealant Chemistry:
  - a. Single Component Urethane Sealants.
  - b. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

B. Joint Locations:

1. Interior joints in vertical and horizontal surfaces where incidental food contact may occur (Break rooms):
  - a. Joints in kitchen counter tops and work surfaces.
  - b. Joints between food service equipment and surrounding construction.
  - c. Other interior joints, where incidental food contact may occur.
2. Type: M (multicomponent) or S (single component).
3. Grade: P (Pourable) or NS (non-sag)

4. Class: 25.
5. Use Related to Exposure: NT (non-traffic).
6. Uses Related to Joint Substrates: M, A and O as applicable to joint substrates indicated.
7. Other Characteristics: Complying with United States Department of Agriculture (USDA) guidelines for incidental food contact with the cured sealant.
8. Acceptable Sealant Chemistry:
  - a. Multicomponent Silicone Sealants
  - b. Single Component Silicone Sealants

C. Joint Locations:

1. Interior Sanitary Sealant: For interior joints between plumbing fixtures and adjoining walls, floors and counters:
  - a. Joints in toilet room and bathroom counter tops.
  - b. Joints between plumbing fixtures and adjacent materials.
  - c. Joints between locker room lockers and adjacent materials.
  - d. Joints between food service equipment and surrounding construction.
  - e. Other interior joints in wet areas where needed to limit mold and mildew growth.
2. Type: S (single component).
3. Grade: NS (nonsag).
4. Class: 25.
5. Use Related to Exposure: NT (non-traffic).
6. Uses Related to Joint Substrates: M, G, A and O as applicable to joint substrates.
  - a. Use "O" Joint Substrates: Coated glass, color anodic aluminum, aluminum coated with a high-performance coating, galvanized steel, masonry ceramic tile and wood.
7. Other Characteristics: Mold and mildew resistant.
8. Acceptable Sealant Chemistry:
  - a. Single Component Silicone Sealants.

D. Joint Locations: Bedding joints under metal thresholds and saddles. Bedding joints between sheet metal flashing and other materials.

1. Single Component Urethane Sealants
2. Single Component Silicone Sealants
3. Single Component Non-Curing Sealants
  - a. Butyl Sealant
  - b. Acoustical Sealant

END OF SECTION 07 92 00

## SECTION 08 11 13

### HOLLOW METAL DOORS AND FRAMES

#### PART 1 - GENERAL

##### 1.1 SUMMARY

###### A. Section Includes:

1. Standard hollow metal doors and frames.

##### 1.2 SUBMITTALS

###### A. Product Data: For each type of product indicated.

###### B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

###### C. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.

###### D. Samples for Initial Selection: For units with factory-applied color finishes.

###### E. Samples for Verification: For each type of exposed finish required.

###### F. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

##### 1.3 QUALITY ASSURANCE

###### A. Fire-Rated Door Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated.

###### B. Fire-Rated, Borrowed-Light Frame Assemblies: Assemblies complying with NFPA 80 that are listed and labeled, by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9. Label each individual glazed lite.

###### C. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

###### A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, CS, Type B; suitable for exposed applications.

###### B. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, CS, Type B.

- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum A40 (ZF120) G60 (Z180) or A60 (ZF180) metallic coating.
- D. Frame Anchors: ASTM A 591/A 591M, Commercial Steel (CS), 40Z (12G) coating designation; mill phosphatized.
  - 1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.
- E. Inserts, Bolts, and Fasteners: Hot-dip galvanized according to ASTM A 153/A 153M.
- F. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.
- G. Mineral-Fiber Insulation: ASTM C 665, Type I.
- H. Glazing: Division 08 Section "Glazing."
- I. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil (0.4-mm) dry film thickness per coat.

## 2.2 STANDARD HOLLOW METAL DOORS

- A. General: Comply with ANSI/SDI A250.8.
  - 1. Design: Flush panel.
  - 2. Core Construction: Manufacturer's standard kraft-paper honeycomb, polystyrene, polyurethane, polyisocyanurate, mineral-board, or vertical steel-stiffener core.
    - a. Fire Door Core: As required to provide fire-protection ratings indicated.
    - b. Thermal-Rated (Insulated) Doors: R-value of not less than 6.0 deg F x h x sq. ft./Btu (1.057 K x sq. m/W) when tested according to ASTM C 1363.
  - 3. Vertical Edges for Single-Acting Doors: Manufacturer's standard.
  - 4. Top and Bottom Edges: Closed with flush or inverted 0.042-inch- (1.0-mm-) thick, end closures or channels of same material as face sheets.
  - 5. Tolerances: SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- B. Exterior Doors: Face sheets fabricated from metallic-coated steel sheet. Comply with ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).
  - 2. Exterior Doors shall be Insulated Thermal Rated.
- C. Interior Doors: Face sheets fabricated from cold-rolled steel sheet. Provide doors complying with requirements indicated below by referencing ANSI/SDI A250.8 for level and model and ANSI/SDI A250.4 for physical performance level:
  - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless).
- D. Hardware Reinforcement: ANSI/SDI A250.6.

## 2.3 STANDARD HOLLOW METAL FRAMES

- A. General: Comply with ANSI/SDI A250.8.
- B. Exterior Frames: Fabricated from metallic-coated steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.

C. Interior Frames: Fabricated from cold-rolled steel sheet.

1. Fabricate frames with mitered or coped corners.
2. Fabricate frames as full profile welded unless otherwise indicated.
3. Frames for Level 2 Steel Doors: 0.053-inch- (1.3-mm-) thick steel sheet.
4. Frames for Wood Doors: 0.042-inch- (1.0-mm-) thick steel sheet.
5. Frames for Borrowed Lights: Same as adjacent door frame.

D. Hardware Reinforcement: ANSI/SDI A250.6.

## 2.4 FRAME ANCHORS

A. Jamb Anchors:

1. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.

B. Floor Anchors: Formed from same material as frames, not less than 0.042 inch (1.0 mm) thick, and as follows:

1. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.

## 2.5 STOPS AND MOLDINGS

A. Moldings for Glazed Lites in Doors: Minimum 0.032 inch (0.8 mm) thick, same material as door face sheet.

B. Fixed Frame Moldings: Formed integral with hollow metal frames, a minimum of 5/8 inch (16 mm) high unless otherwise indicated.

C. Loose Stops for Glazed Lites in Frames: Minimum 0.032 inch (0.8 mm) thick, same material as frames.

## 2.6 GROUT

A. Grout: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.

## 2.7 FABRICATION

A. Tolerances: Fabricate hollow metal work to tolerances indicated in SDI 117.

B. Hollow Metal Doors:

1. Exterior Doors: Provide weep-hole openings in bottom of exterior doors. Seal joints in top edges of doors against water penetration.
2. Glazed Lites: Factory cut openings in doors.
3. Astragals: Provide overlapping astragal on one leaf of pairs of doors where required by NFPA 80 for fire-performance rating or where indicated.

C. Hollow Metal Frames: Where frames are fabricated in sections, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

1. Welded Frames: Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible.
  2. Sidelight Frames: Provide closed tubular members with no visible face seams or joints, fabricated from same material as door frame. Fasten members at crossings and to jambs by butt welding.
  3. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  4. Grout Guards: Weld guards to frame at back of hardware mortises in frames to be grouted.
  5. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
  6. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Masonry Type (at Concrete): Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
      - 1) Two anchors per jamb up to 60 inches (1524 mm) high.
      - 2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
      - 3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.
      - 4) Four anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.
    - b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
      - 1) Three anchors per jamb up to 60 inches (1524 mm) high.
      - 2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
      - 3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
      - 4) Five anchors per jamb plus 1 additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.
      - 5) Two anchors per head for frames more than 42 inches (1066 mm) wide and mounted in metal-stud partitions.
    - c. Compression Type: Not less than two anchors in each jamb.
    - d. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.
  7. Door Silencers: Except on weather-stripped doors, drill stops to receive door silencers.
    - a. Single-Door Frames: Three door silencers.
    - b. Double-Door Frames: Two door silencers.
- D. Hardware Preparation: Factory prepare hollow metal work to receive templated mortised hardware according to the Door Hardware Schedule and templates furnished as specified in Division 08 Section "Door Hardware."
1. Locate hardware as indicated, or if not indicated, according to ANSI/SDI A250.8.
  2. Reinforce doors and frames to receive nontemplated, mortised and surface-mounted door hardware.
  3. Comply with applicable requirements in ANSI/SDI A250.6 and ANSI/DHI A115 Series specifications for preparation of hollow metal work for hardware.
  4. Coordinate locations of conduit and wiring boxes for electrical connections with Division 26 electrical Sections.
- E. Stops and Moldings: Provide stops and moldings around glazed lites where indicated. Form corners of stops and moldings with butted or mitered hairline joints.
1. Single Glazed Lites: Provide fixed stops and moldings welded on secure side of hollow metal work.
  2. Multiple Glazed Lites: Provide fixed and removable stops and moldings so that each glazed lite is capable of being removed independently.

3. Provide fixed frame moldings on outside of exterior and on secure side of interior doors and frames.
4. Provide loose stops and moldings on inside of hollow metal work.
5. Coordinate rabbet width between fixed and removable stops with type of glazing and type of installation indicated.

## 2.8 STEEL FINISHES

- A. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
  1. Shop Primer: ANSI/SDI A250.10.
- B. Factory-Applied Paint Finish: ANSI/SDI A250.3.
  1. Color and Gloss: Match Architect's sample.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Hollow Metal Frames: Comply with ANSI/SDI A250.11.
  1. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    - a. At fire-protection-rated openings, install frames according to NFPA 80.
    - b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
    - c. Install frames with removable glazing stops located on secure side of opening.
    - d. Install door silencers in frames before grouting.
    - e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
    - f. Check plumbness, squareness, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
    - g. Field apply bituminous coating to backs of frames that are filled with grout containing antifreezing agents.
  2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
    - a. Floor anchors may be set with powder-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.
  3. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
  4. Exterior Walls: Solid grout frames.
  5. Concrete Walls: Solidly fill space between frames and concrete with grout. Take precautions, including bracing frames, to ensure that frames are not deformed or damaged by grout forces.
  6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  7. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  8. Ceiling Struts: Extend struts vertically from top of frame at each jamb to overhead structural supports or substrates above frame unless frame is anchored to masonry or to other structural

- support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction. Provide adjustable wedged or bolted anchorage to frame jamb members.
9. Installation Tolerances: Adjust hollow metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
    - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs at floor.

B. Hollow Metal Doors: Fit hollow metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Standard Steel Doors:

- a. Jambs and Head: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
- b. Between Edges of Pairs of Doors: 1/8 inch (3 mm) plus or minus 1/16 inch (1.6 mm).
- c. Between Bottom of Door and Top of Threshold: Maximum 3/8 inch (9.5 mm).
- d. Between Bottom of Door and Top of Finish Floor (No Threshold): Maximum 3/4 inch (19 mm).

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

3. Smoke-Control Doors: Install doors according to NFPA 105.

C. Glazing: Comply with installation requirements in Division 08 Section "Glazing" and with hollow metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (50 mm) o.c. from each corner.

### 3.2 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow metal work that is warped, bowed, or otherwise unacceptable.
- B. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.
- C. Metallic-Coated Surfaces: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

END OF SECTION 08 11 13

SECTION 08 14 16

FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Solid-core doors with wood-veneer faces.
2. Factory finishing flush wood doors.

B. Related Sections:

1. Division 08 Section "Glazing" for glass view panels in flush wood doors.

1.2 SUBMITTALS

A. Product Data: For each type of door indicated. Include factory-finishing specifications.

B. LEED Submittals:

1. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regionally manufactured and regionally extracted and manufactured materials. Include statement indicating cost for each regionally manufactured material.
  - a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
  - b. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.
3. Certificates for Credit MR 6 and Credit MR 7: Chain-of-custody certificates indicating that flush wood doors comply with forest certification requirements. Include documentation that manufacturer is certified for chain of custody by an FSC-accredited certification body. Include statement indicating cost for each certified wood product.
4. Product Data for Credit IEQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.
5. Laboratory Test Reports for Credit IEQ 4.2: For paints and coatings, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Shop Drawings: Indicate location, size, and hand of each door; elevation of each kind of door; construction details not covered in Product Data; location and extent of hardware blocking; and other pertinent data.

1. Indicate dimensions and locations of cutouts.
2. Indicate requirements for veneer matching.

3. Indicate doors to be factory finished and finish requirements.
4. Indicate fire-protection ratings for fire-rated doors.

D. Samples: For factory-finished doors.

1. Factory finishes applied to actual door face materials, approximately 8 by 10 inches (200 by 250 mm), for each material and finish. For each transparent finish, provide set of three Samples showing typical range of color and grain to be expected in finished Work.
2. Corner sections of doors, approximately 8 by 10 inches (200 by 250 mm), with door faces and edges representing actual materials to be used.
  - a. Provide Samples for each species of veneer and solid lumber required.
  - b. Finish veneer-faced door Samples with same materials proposed for factory-finished doors.
3. Frames for light openings, 6 inches (150 mm) long, for each material, type, and finish required.

### 1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Quality Standard: In addition to requirements specified, comply with AWI's "Architectural Woodwork Quality Standards Illustrated."
- C. Forest Certification: Provide doors made with cores not less than 70 percent of wood products obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- D. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252.

## PART 2 - PRODUCTS

### 2.1 DOOR CONSTRUCTION, GENERAL

- A. Low-Emitting Materials: Provide doors made with adhesives and composite wood products that do not contain urea formaldehyde.
- B. WDMA I.S.1-A Performance Grade:
  1. Heavy Duty unless otherwise indicated.
- C. Particleboard-Core Doors:
  1. Particleboard: ANSI A208.1, Grade LD-1 or Grade LD-2, made with binder containing no urea-formaldehyde resin.
  2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
- D. Fire-Protection-Rated Doors: Provide core specified or mineral core as needed to provide fire-protection rating indicated.

- E. Regional Materials: Flush wood doors shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
- F. Certified Wood: Flush wood doors shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and to FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
- G. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.

## 2.2 VENEERED-FACED DOORS FOR TRANSPARENT FINISH

- A. Interior Solid-Core Doors:
  - 1. Grade: Custom (Grade A faces).
  - 2. Species: Select birch.
  - 3. Cut: Rift cut.
  - 4. Assembly of Veneer Leaves on Door Faces: Balance match.
  - 5. Pair and Set Match: Provide for doors hung in same opening.
  - 6. Core: Particleboard.
  - 7. Construction: Five plies. Stiles and rails are bonded to core, then entire unit abrasive planed before veneering.
  - 8. Construction: Seven plies, either bonded or non-bonded construction.
- B. Interior Full Lite Doors: Solid wood (birch), dimensioned light opening as indicated.
  - 1. Metal frame light opening.
- C. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet; with baked-enamel- or powder-coated finish; and approved for use in doors of fire-protection rating indicated.

## 2.3 FABRICATION

- A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
  - 1. Comply with requirements in NFPA 80 for fire-rated doors.
- B. Factory machine doors for hardware that is not surface applied.
- C. Openings: Cut and trim openings through doors in factory.
  - 1. Light Openings: Trim openings with moldings of material and profile indicated.
  - 2. Glazing: Factory install glazing in doors indicated to be factory finished. Comply with applicable requirements in Division 08 Section "Glazing."
  - 3. Louvers: Factory install louvers in prepared openings.

## 2.4 LIGHT FRAMES AND LOUVERS

- A. Metal Louvers:
  - 1. Blade Type: Vision-proof, inverted V.
  - 2. Metal and Finish: Hot-dip galvanized steel, 0.040 inch (1.0 mm) thick, factory primed for paint finish.

- B. Metal Louvers for openings in Fire-Rated Doors: Fusible link louver model FLDL-UL as manufactured by Anemostat Door Products or comparable product acceptable to Architect.
  - 1. 90 minute fire-rating.
  - 2. Galvanized with grey primer, ready for field painting.
- C. Metal Frames for Light Openings in Fire-Rated Doors: Manufacturer's standard frame formed of 0.048-inch- (1.2-mm-) thick, cold-rolled steel sheet; factory primed for paint finish; and approved for use in doors of fire-protection rating indicated.

## 2.5 FACTORY FINISHING

- A. General: Comply with referenced quality standard for factory finishing. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
  - 1. Finish faces, all four edges, edges of cutouts, and mortises. Stains and fillers may be omitted on top and bottom edges, edges of cutouts, and mortises.
- B. Finish doors at factory that are indicated to receive transparent finish. Field finish doors indicated to receive opaque finish.
- C. Semi-Transparent Finish:
  - 1. Grade: Custom.
  - 2. Finish: AWI catalyzed polyurethane system.
  - 3. Staining: Minimum of two different door colors. Stain colors shall be custom non-natural stains (Blue, turquoise, etc.) as selected by Architect.
  - 4. Sheen: Semi-gloss.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Hardware: For installation, see Division 08 Section "Door Hardware."
- B. Installation Instructions: Install doors to comply with manufacturer's written instructions and the referenced quality standard, and as indicated.
  - 1. Install fire-rated doors in corresponding fire-rated frames according to NFPA 80.
- C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION 08 14 16

## SECTION 08 31 13

### ACCESS DOORS AND FRAMES

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Access doors and frames for walls and ceilings.

##### 1.3 SUBMITTALS

- A. Product Data: For each type of access door and frame indicated. Include construction details, materials, individual components and profiles, and finishes.
- B. Shop Drawings: Show fabrication and installation details of access doors and frames for each type of substrate. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each door face material, at least 3 by 5 inches (75 by 125 mm) in size, in specified finish.
- D. Ceiling Coordination Drawings: Reflected ceiling plans, drawn to scale, on which ceiling-mounted items including access doors and frames, lighting fixtures, diffusers, grilles, speakers, sprinklers, and special trim are shown and coordinated with each other.

##### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each type of access door(s) and frame(s) through one source from a single manufacturer.
- B. Size Variations: Obtain Architect's acceptance of manufacturer's standard-size units, which may vary slightly from sizes indicated.

##### 1.5 COORDINATION

- A. Verification: Determine specific locations and sizes for access doors needed to gain access to concealed plumbing, mechanical, or other concealed work, and indicate in the schedule specified in "Submittals" Article.

## PART 2 - PRODUCTS

### 2.1 STEEL MATERIALS

- A. Steel Sheet: Uncoated or electrolytic zinc-coated, ASTM A 591/A 591M with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
- B. Steel Finishes: Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Surface Preparation for Steel Sheet: Clean surfaces to comply with SSPC-SP 1, "Solvent Cleaning," to remove dirt, oil, grease, or other contaminants that could impair paint bond. Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning," or SSPC-SP 8, "Pickling."
  - 2. Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard thermosetting polyester or acrylic urethane powder coating with cured-film thickness not less than 1.5 mils (0.04 mm). Prepare, treat, and coat metal to comply with resin manufacturer's written instructions.
- C. Drywall Beads: Edge trim formed from 0.0299-inch (0.76-mm) zinc-coated steel sheet formed to receive joint compound and in size to suit thickness of gypsum board.
  - 1. At showers, drywall beads shall be stainless steel.

### 2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS

- A. Medium-Security, Flush Access Doors with Trimless Frames: Fabricated from steel sheet.
  - 1. Locations: Wall and ceiling surfaces.
  - 2. Door: Minimum 0.105-inch- (2.7-mm-) thick sheet metal, flush construction.
    - a. At gas shut-off locations, provide, clear acrylic vision panel in door.
  - 3. Frame: Minimum 0.105-inch- (2.7-mm-) thick sheet metal with drywall bead.
  - 4. Hinges: Concealed continuous piano.
  - 5. Lock: Cylinder
    - a. Lock Preparation: Prepare door panel to accept cylinder specified in Division 8 Section "Door Hardware."

### 2.3 FABRICATION

- A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
- B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
- C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of supports indicated.
  - 1. For trimless frames with drywall bead, provide edge trim for gypsum board securely attached to perimeter of frames.
  - 2. For trimless frames with plaster bead for full-bed plaster applications, provide zinc-coated expanded metal lath and exposed casing bead welded to perimeter of frames.
  - 3. Provide mounting holes in frames for attachment of units to metal or wood framing.

Part 2 of Section 08 31 13 – Access Doors and Frames.

B Recessed Access Doors with Concealed Flanges:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - a. Babcock-Davis.
  - b. JL Industries, Inc.; a division of the Activar Construction Products Group.
  - c. Lane-Aire Manufacturing Corp.
  - d. Larsens Manufacturing Company.
  - e. Milcor; Commercial Products Group of Hart & Cooley, Inc.
2. Description: Door face recessed 5/8 inch (16 mm) for gypsum board infill; with concealed flange for gypsum board installation and concealed hinge.
3. Locations: Ceiling.
4. Door Size: As indicated.
5. Uncoated Steel Sheet for Door: Nominal 0.060 inch (1.52 mm), 16 gage, factory primed.
6. Latch and Lock: Cam latch, screwdriver operated.

4. Provide mounting holes in frame for attachment of masonry anchors.
- D. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
  1. For cylinder lock, furnish two keys per lock and key all locks to a single key.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Comply with manufacturer's written instructions for installing access doors and frames.
- B. Set frames accurately in position and attach securely to supports with plane of face panels aligned with adjacent finish surfaces.
- C. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

#### 3.2 ADJUSTING AND CLEANING

- A. Adjust doors and hardware after installation for proper operation.
- B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 31 13

SECTION 08 33 26

OVERHEAD COILING GRILLES

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. Open-curtain overhead coiling grilles.

1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design overhead coiling grilles, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- B. Operation Cycles: Provide overhead coiling grille components and operators capable of operating for not less than number of cycles indicated for each grille. One operation cycle is complete when a grille is opened from the closed position to the fully open position and returned to the closed position.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type and size of overhead coiling grille and accessory. Include the following:
  - 1. Construction details, material descriptions, dimensions of individual components, profiles for curtain components, and finishes.
  - 2. Rated capacities, operating characteristics, electrical characteristics, and furnished accessories.
- B. Shop Drawings: For each installation and for special components not dimensioned or detailed in manufacturer's product data. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  - 2. Wiring Diagrams: For power, signal, and control wiring.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For overhead coiling grilles to include in maintenance manuals.

## 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for both installation and maintenance of units required for this Project.
- B. Source Limitations: Obtain overhead coiling grilles from single source from single manufacturer.
  - 1. Obtain operators and controls from overhead coiling grille manufacturer.
- C. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- D. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

## PART 2 - PRODUCTS

### 2.1 OPEN-CURTAIN GRILLE ASSEMBLY

- A. Open-Curtain Grille: Overhead coiling grille with a curtain having a network of horizontal rods that interconnect with vertical links.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Type JMG – Motor (Gearhead – Vertical) Operated Rolling Grille as manufactured by The Cookson Company or comparable product acceptable to the Architect.
    - a. Features: Clear anodized aluminum, between jamb mounted, standard pattern 5014-M92, with “featheredge.”
- B. Operation Cycles: Not less than 50,000.
  - 1. Include tamperproof cycle counter.
- C. Grille Curtain Material: Aluminum.
  - 1. Space rods at approximately 2 inches (51 mm) o.c.
  - 2. Space links approximately 9 inches (228 mm) apart in a straight in-line pattern.
  - 3. Spacers: Metal tubes matching curtain material.
- D. Curtain Jamb Guides: Aluminum with exposed finish matching curtain slats. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise.
- E. Hood: Aluminum.
  - 1. Shape: Round to fit the curvature of the brackets.
  - 2. Mounting: As shown on Drawings.
- F. Locking Devices: Equip grille with locking device assembly.
  - 1. Locking Device Assembly: Cylinder lock in the bottom bar, electrically interlocked to prevent the motor from operating when the grille is locked.
- G. Electric Grille Operator:
  - 1. Operator Location: As shown on Drawings.
  - 2. Motor Exposure: Interior.
  - 3. Emergency Manual Operation: Push-up type.

4. Obstruction-Detection Device: Automatic sensor edge on bottom bar with air wave technology.
5. Remote-Control Station: Interior.

H. Grille Finish:

1. Aluminum Finish: Clear anodized.

2.2 GRILLE CURTAIN MATERIALS AND CONSTRUCTION

- A. Open-Curtain Grilles: Fabricate metal grille curtain as an open network of horizontal rods, spaced at regular intervals, that are interconnected with vertical links, which are formed and spaced as indicated and are free to rotate on the rods.
- B. Grille Curtain Jamb Guides: Manufacturer's standard shape having curtain groove with return lips or bars to retain curtain. Provide continuous integral wear strips to prevent metal-to-metal contact and to minimize operational noise; with removable stops on guides to prevent over-travel of curtain.

2.3 ELECTRIC GRILLE OPERATORS

- A. General: Electric grille operator assembly of size and capacity recommended and provided by grille manufacturer for grille and operation-cycles requirement specified, 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 grille, and accessories required for proper operation.
  1. Comply with NFPA 70.
  2. Provide control equipment complying with NEMA ICS 1, NEMA ICS 2, and NEMA ICS 6, with NFPA 70 Class 2 control circuit, maximum 24 V, ac or dc.
- B. Usage Classification: Electric operator and components capable of operating for not less than number of cycles per hour indicated for each grille.
- C. Electric Motors: Comply with NEMA designation, temperature rating, service factor, enclosure type, and efficiency requirements specified in Division 28.
  1. Electrical Characteristics: Coordinate with electrical requirements indicated on drawings.
- D. Limit Switches: Equip each motorized grille with adjustable switches interlocked with motor controls and set to automatically stop grille at fully opened and fully closed positions.
- E. Motor Removal: Design operator so motor may be removed without disturbing limit-switch adjustment and without affecting emergency manual operation.

2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 INSTALLATION

- A. Install overhead coiling grilles and operating equipment complete with necessary hardware, anchors, inserts, hangers, and equipment supports; according to manufacturer's written instructions and as specified.
- B. Install overhead coiling grilles, hoods, and operators at the mounting locations indicated for each grille.
- C. Accessibility: Install overhead coiling grilles, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility.

### 3.3 STARTUP SERVICE

- A. Engage a factory-authorized service representative to perform startup service.
  - 1. Perform installation and startup checks according to manufacturer's written instructions.
  - 2. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.
  - 3. Test grille opening when activated by detector, fire-alarm system, emergency-egress release, or self-opening mechanism as required. Reset grille-opening mechanism after successful test.

### 3.4 ADJUSTING

- A. Adjust hardware and moving parts to function smoothly so that grilles operate easily, free of warp, twist, or distortion.
- B. Lubricate bearings and sliding parts as recommended by manufacturer.

### 3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain overhead coiling grilles.

END OF SECTION 08 33 26

SECTION 08 34 73

WOOD SOUND CONTROL DOOR ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes wood sound control door assemblies.

1.3 COORDINATION

- A. Coordinate installation of anchorages for sound control door assemblies. Furnish setting drawings, templates, and directions for installing anchorages. Deliver sleeves, inserts, anchor bolts, and items with integral anchors to Project site in time for installation.

1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Insert location.
  - 1. Review procedures for coordinating frame and anchor installation with wall construction.
  - 2. Review required field quality-control procedures.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include sound ratings, construction details, material descriptions, core descriptions, fire-resistance rating, and finishes.
- B. LEED Submittals:
  - 1. Certificates for Credit MR 6 and Credit MR 7: Chain-of-custody certificates indicating that flush wood doors comply with forest certification and chain-of-custody requirements. Include statement indicating cost for each certified wood product.
  - 2. Product Data for Credit IEQ 4.4: For adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.
- C. Shop Drawings: For sound control door assemblies.
- D. Samples for Initial Selection: For units with factory-applied finishes.
- E. Samples for Verification: For each type of exposed finish not less than 3 by 5 inches (76 by 127 mm).
  - 1. Doors and Frames: Samples approximately 12 by 12 inches (305 by 305 mm).
    - a. Doors: Include section of vertical-edge, top, and bottom construction; automatic door bottom or gasket; core construction; glazing; and hinge and other applied hardware reinforcement.

b. Frames: Include profile, corner joint, floor and wall anchors, and seals.

F. Schedule: Provide a schedule of sound control door assemblies prepared using same reference numbers for details and openings as those on Drawings. Coordinate with the Door Hardware Schedule.

#### 1.6 INFORMATIONAL SUBMITTALS

A. Product Certificates: For each type of sound control door assembly.

B. Sample Warranty: For manufacturer's special warranties.

#### 1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sound control door assemblies to include in maintenance manuals.

#### 1.8 QUALITY ASSURANCE

A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body and is a certified participant in AWI's Quality Certification Program.

B. Vendor Qualifications: A vendor that is certified for chain of custody by an FSC-accredited certification body.

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

D. Acoustical Testing Agency Qualifications: An independent agency accredited as an acoustical laboratory according to the National Voluntary Laboratory Accreditation Program of NIST.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver doors and frames palletized, wrapped, or crated to provide protection during transit and Project-site storage. Avoid the use of nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store doors and frames vertically under cover at Project site with head up. Place on minimum 4-inch-(102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

#### 1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not deliver or install wood sound control doors until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

#### 1.11 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of sound control door assemblies that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:
  - a. Failure to meet sound rating requirements.
  - b. Faulty operation of sound seals.
  - c. Deterioration of metal frames, metal finishes, and other materials beyond normal use or weathering.
  - d. Wood doors that are warped (bow, cup, or twist) more than 1/4 inch (6 mm) in a 42-by-84-inch (1067-by-2134-mm) section, or show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch (0.25 mm in a 75-mm) span.
2. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Sound Rating: Provide sound control door assemblies identical to those of assemblies tested as sound-retardant units by an acoustical testing agency, and have the following minimum rating:
  1. STC Rating: STC 33 as calculated by ASTM E 413 when tested in an operable condition according to ASTM E 90.
- B. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
  1. Smoke- and Draft Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

### 2.2 WOOD SOUND CONTROL DOORS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. Ambico Limited.
  2. Eggers Industries.
  3. Krieger Specialty Products Company.
  4. Marshfield DoorSystems, Inc.
  5. Overly Door Company.
  6. Security Acoustics.
  7. Vancouver Door Company.
- B. Source Limitations: Obtain wood sound control door assemblies, including doors, frames, sound control seals, hinges, thresholds, and other items essential for sound control, from single source from single manufacturer.
- C. Certified Wood: Wood doors shall be certified as "FSC Pure" or "FSC Mixed Credit" according to FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship," and to FSC STD-40-004, "FSC Standard for Chain of Custody Certification."
- D. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.
- E. Doors: Flush-design sound control doors, 1-3/4 inches (44 mm) thick; with manufacturer's standard sound-retardant core as required to provide STC and fire rating indicated. Fabricate according to WDMA I.S.1-A.

- F. Materials: Comply with Section 08 14 16 "Flush Wood Doors" for grade, faces, veneer matching, fabrication, finishing, and other requirements unless otherwise indicated.
1. Glazing: As required by sound control door assembly manufacturer to comply with sound control and fire-rated-door labeling requirements.

G. Finishes:

1. Factory finish sound control wood doors to match doors specified in Section 08 14 16 "Flush Wood Doors."

## 2.3 SOUND CONTROL FRAMES

A. Frames: Fabricate sound control door frames with corners mitered, reinforced, and continuously welded the full depth and width of frame. Fabricate according to NAAMM-HMMA 865.

1. Weld frames according to NAAMM-HMMA 820.
2. Interior Frames: Fabricate from cold-rolled steel sheet unless otherwise indicated, 0.075-inch (1.90-mm) nominal thickness or thicker as required to provide STC rating indicated.
3. Hardware Reinforcement: Fabricate according to NAAMM-HMMA 865 of same material as face sheets.
4. Head Reinforcement: Metallic-coated steel channel or angle stiffener, 0.108-inch (2.74-mm) nominal thickness.
5. Jamb Anchors:
  - a. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.064-inch (1.63-mm) nominal-thickness metallic-coated steel with corrugated or perforated straps not less than 2 inches (51 mm) wide by 10 inches (254 mm) long; or wire anchors not less than 0.156 inch (3.9 mm) thick.
  - b. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.048-inch (1.21-mm) nominal-thickness uncoated steel unless otherwise indicated.
  - c. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch- (9.5-mm-) diameter, metallic-coated steel bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.
6. Floor Anchors: Not less than 0.079-inch (2.01-mm) nominal-thickness metallic-coated steel, and as follows:
  - a. Monolithic Concrete Slabs: Clip-type anchors, with two holes to receive fasteners.
  - b. Separate Topping Concrete Slabs: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at finish floor surface.
7. Ceiling Struts: Minimum 3/8-inch-thick by 2-inch- (9.5-mm-thick by 50-mm-) wide uncoated steel unless otherwise indicated.
8. Plaster Guards: Metallic-coated steel sheet, not less than 0.026 inch (0.6 mm) thick.

B. Materials:

1. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
2. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
3. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B, with G60 (Z180) zinc (galvanized) or A40 (ZF120) zinc-iron-alloy (galvannealed) coating designation.
4. Supports and Anchors: After fabricating, galvanize units to be built into exterior walls according to ASTM A 153/A 153M, Class B.

5. Inserts, Bolts, and Fasteners: Provide items to be built into exterior walls, hot-dip galvanized according to ASTM A 153/A 153M or ASTM F 2329.
6. Powder-Actuated Fasteners in Concrete: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with clips or other accessory devices for attaching sound control door frames of type indicated.
7. Mineral-Fiber Insulation: Insulation composed of rock-wool fibers, slag-wool fibers, or glass fibers.

C. Finishes:

1. Prime Finish: Apply manufacturer's standard primer immediately after cleaning and pretreating.
  - a. Shop Primer: Manufacturer's standard, fast-curing, lead- and chromate-free primer complying with SDI A250.10 acceptance criteria; recommended by primer manufacturer for substrate; compatible with substrate and field-applied coatings despite prolonged exposure.

## 2.4 HARDWARE

A. Sound Control Door Hardware: Manufacturer's standard sound control system, including head and jamb seals, door bottoms, cam-lift hinges, and thresholds, as required by testing to achieve STC and fire rating indicated.

1. Head and Jamb Seals: One of the following:
  - a. Neoprene Compression Seals: One-piece units consisting of closed-cell sponge neoprene seal held in place by metal retainer, with retainer cover of same material as door frame; attached to door frame with concealed screws.
  - b. Silicone Compression Seals: One-piece units consisting of silicone compression bulb and stabilizer flange; attached to door frame adhesively.
  - c. Magnetic Seals: One-piece units consisting of closed-cell sponge neoprene seal and resiliently mounted magnet held in place by metal retainer, with retainer cover of same material as door frame; attached to door frame with concealed screws.
2. Automatic Door Bottoms: Neoprene or silicone gasket, held in place by metal housing, that automatically drops to form seal when door is closed; mounted to bottom edge of door with screws.
  - a. Mounting: Mortised or semimortised into bottom of door as required by testing to achieve STC rating indicated.
3. Door Bottoms: Neoprene or silicone gasket held in place by metal housing; mortised into bottom edge of door.
4. Cam-Lift Hinges: Full-mortise template type that raises door 1/2 inch (13 mm) when door is fully open; with hardened pin; fabricated from stainless steel.
5. Thresholds: Flat, smooth, unfluted type as recommended by manufacturer; fabricated from aluminum.
  - a. Finish: Clear anodic finish.

B. Other Hardware: Comply with requirements in Section 08 71 00 "Door Hardware."

## 2.5 SOUND CONTROL ACCESSORIES

A. Glazing: Manufacturers' standard factory-installed glazing.

- B. Grout: Comply with ASTM C 476, with a slump of not more than 4 inches (102 mm) as measured according to ASTM C 143/C 143M.
- C. Corrosion-Resistant Coating: Cold-applied asphalt mastic, compounded for 15-mil (0.4-mm) dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

## 2.6 FABRICATION

- A. Wood Sound Control Door Fabrication: Factory fit doors to suit frame-opening sizes indicated, with uniform clearances and bevels according to WDMA I.S.1-A unless otherwise indicated. Comply with final door hardware schedules and hardware templates.
  - 1. Comply with requirements in NFPA 80 for fire-rated and smoke control doors.
  - 2. Glazed Lites: Factory install glazed lites according to requirements of tested assembly to achieve STC rating indicated.
  - 3. Locate door hardware as indicated, or if not indicated, according to DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
    - a. Coordinate measurements of hardware mortises in steel frames to verify dimensions and alignment before factory machining.
- B. Sound Control Frame Fabrication: Fabricate sound control frames to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for thickness of metal. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.
  - 1. Weld flush face joints continuously; grind, fill, dress, and make smooth, flush, and invisible. Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated from same thickness metal as frames.
  - 2. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.
  - 3. Floor Anchors: Weld anchors to bottom of jambs and mullions with at least four spot welds per anchor.
  - 4. Jamb Anchors: Provide number and spacing of anchors as follows:
    - a. Masonry Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
      - 1) Two anchors per jamb up to 60 inches (1524 mm) in height.
      - 2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) in height.
      - 3) Four anchors per jamb from 90 to 96 inches (2286 to 2438 mm) in height.
      - 4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm), or fraction thereof, more than 96 inches (2438 mm) in height.
    - b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
      - 1) Three anchors per jamb up to 60 inches (1524 mm) in height.
      - 2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) in height.
      - 3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) in height.
      - 4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm), or fraction thereof, more than 96 inches (2438 mm) in height.
      - 5) Two anchors per head for frames more than 42 inches (1066 mm) wide and mounted in metal-stud partitions.
    - c. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.

5. Head Reinforcement: For grouted frames more than 48 inches (1219 mm) wide, weld continuous head reinforcement to back of frame at head full width of opening.
6. Hardware Preparation: Factory prepare sound control frames to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping.
  - a. Reinforce frames to receive nontemplated mortised and surface-mounted door hardware.
7. Tolerances: Fabricate frames to tolerances indicated in NAAMM-HMMA 865.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.
- B. Examine roughing-in for embedded and built-in anchors to verify actual locations of sound control door frame connections before frame installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.
- B. Prior to installation, adjust and securely brace sound control door frames to the following tolerances:
  1. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
  2. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
  3. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
  4. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.
- C. Drill and tap doors and frames to receive nontemplated mortised and surface-mounted door hardware.

### 3.3 INSTALLATION

- A. General: Install sound control door assemblies plumb, rigid, properly aligned, and securely fastened in place; comply with manufacturer's written instructions.
- B. Frames: Install sound control door frames in sizes and profiles indicated.
  1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
    - a. At fire-rated openings, install frames according to NFPA 80.
    - b. At openings requiring smoke and draft control, install frames according to NFPA 105.
    - c. Where frames are fabricated in sections due to shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, and dress; make splice smooth, flush, and invisible on exposed faces.

- d. Install sound control frames with removable glazing stops located on secure side of opening.
  - e. Remove temporary braces only after frames or bucks have been properly set and secured.
  - f. Check squareness, twist, and plumbness of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
  - g. Apply corrosion-resistant coating to backs of frames to be filled with mortar, grout, and plaster containing antifreezing agents.
2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
  3. Metal-Stud Partitions: Fully fill frames with mineral-fiber insulation.
  4. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  5. In-Place Gypsum Board Partitions: Secure frames in place with postinstalled expansion anchors through floor anchors at each jamb. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
  6. Ceiling Struts: Extend struts vertically from top of frame at each jamb to supporting construction above unless frame is anchored to masonry or to other structural support at each jamb. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable wedged or bolted anchorage to frame jamb members.
  7. Installation Tolerances: Adjust sound control door frames for squareness, alignment, twist, and plumbness to the following tolerances:
    - a. Squareness: Plus or minus 1/16 inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.
    - b. Alignment: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.
    - c. Twist: Plus or minus 1/16 inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.
    - d. Plumbness: Plus or minus 1/16 inch (1.6 mm), measured at jambs on a perpendicular line from head to floor.
- C. Doors: Fit sound control doors accurately in frames, within clearances indicated below. Shim as necessary.
1. Non-Fire-Rated Doors: Fit non-fire-rated doors accurately in frames with the following clearances:
    - a. Jambs: 1/8 inch (3 mm).
    - b. Head with Butt Hinges: 1/8 inch (3 mm).
    - c. Head with Cam-Lift Hinges: As required by manufacturer, but not more than 3/8 inch (9.5 mm).
    - d. Sill: Manufacturer's standard.
    - e. Between Edges of Pairs of Doors: 1/8 inch (3 mm).
  2. Fire-Rated Doors: Install fire-rated doors with clearances according to NFPA 80.
- D. Sound Control Seals: Where seals have been factory prefit and preinstalled and subsequently removed for shipping, reinstall seals and adjust according to manufacturer's written instructions.
- E. Cam-Lift Hinges: Install hinges according to manufacturer's written instructions.
- F. Thresholds: Set thresholds in full bed of sealant complying with requirements in Section 07 92 00 "Joint Sealants."
- G. Glazing: Comply with installation requirements in Section 08 80 00 "Glazing" and with sound control door assembly manufacturer's written instructions.
1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

3.4 ADJUSTING AND CLEANING

- A. Final Adjustments: Check and adjust seals, door bottoms, and other sound control hardware items right before final inspection. Leave work in complete and proper operating condition.
- B. Remove and replace defective work, including defective or damaged sound seals and doors and frames that are warped, bowed, or otherwise unacceptable.
  - 1. Adjust gaskets, gasket retainers, and retainer covers to provide contact required to achieve STC rating.
- C. Prime-Coat Touchup: Immediately after erection of frames, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible, rust-inhibitive, air-drying primer.

END OF SECTION 08 34 73

SECTION 08 41 13

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Exterior and interior storefront framing.
  - 2. Storefront framing for punched openings.
  - 3. Aluminum entrance systems.

1.3 DEFINITIONS

- A. ADA/ABA Accessibility Guidelines: U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disability Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities."

1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
  - 1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
  - 2. Dimensional tolerances of building frame and other adjacent construction.
  - 3. Failure includes the following:
    - a. Deflection exceeding specified limits.
    - b. Thermal stresses transferring to building structure.
    - c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
    - d. Noise or vibration created by wind and by thermal and structural movements.
    - e. Loosening or weakening of fasteners, attachments, and other components.
    - f. Sealant failure.
    - g. Failure of operating units.
- B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Structural Loads:
  - 1. Wind Loads: As indicated on Structural Drawings.
  - 2. Seismic Loads: As indicated on Structural Drawings.

- D. Deflection of Framing Members:
1. Deflection Normal to Wall Plane: Limited to edge of glass in a direction perpendicular to glass plane shall not exceed  $L/175$  of the glass edge length for each individual glazing lite or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19 mm), whichever is less.
  2. Deflection Parallel to Glazing Plane: Limited to  $L/360$  of clear span or 1/8 inch (3.2 mm), whichever is smaller.
- E. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. (0.03 L/s per sq. m) of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 6.24 lbf/sq. ft. (300 Pa).
- F. Water Penetration under Static Pressure: Provide aluminum-framed systems that do not evidence water penetration through fixed glazing and framing areas when tested according to ASTM E 331 at a minimum static-air-pressure difference of 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
- G. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

## 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for aluminum-framed systems.
- B. LEED Submittals:
1. Product Data for Credit IEQ 4.1: For glazing sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
- C. Shop Drawings: For aluminum-framed systems. Include plans, elevations, sections, details, and attachments to other work.
1. Include details of provisions for system expansion and contraction and for drainage of moisture in the system to the exterior.
  2. For entrance doors, include hardware schedule and indicate operating hardware types, functions, quantities, and locations.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- E. Fabrication Sample: Of each vertical-to-horizontal intersection of aluminum-framed systems, made from 12-inch (300-mm) lengths of full-size components and showing details of the following:
1. Joinery, including concealed welds.
  2. Anchorage.
  3. Expansion provisions.
  4. Glazing.
  5. Flashing and drainage.
- F. Other Action Submittals:
1. Entrance Door Hardware Schedule: Prepared by or under the supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

- G. Delegated-Design Submittal: For aluminum-framed systems indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
  - 1. Detail fabrication and assembly of aluminum-framed systems.
  - 2. Include design calculations.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.
  - 1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for aluminum-framed systems, indicating compliance with performance requirements.
- C. Warranties: Sample of special warranties.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed systems to include in maintenance manuals.

#### 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Engineering Responsibility: Prepare data for aluminum-framed systems, including Shop Drawings, based on testing and engineering analysis of manufacturer's standard units in systems similar to those indicated for this Project.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for systems' aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction. Performance characteristics are indicated by criteria subject to verification by one or more methods including preconstruction testing, field testing, and in-service performance.
  - 1. Do not revise intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If revisions are proposed, submit comprehensive explanatory data to Architect for review.
- D. Accessible Entrances: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.
- E. Source Limitations for Aluminum-Framed Systems: Obtain from single source from single manufacturer.
- F. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
  - 1. Build mockup of typical wall area.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 3. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

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

## 1.9 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of structural supports for aluminum-framed systems by field measurements before fabrication and indicate measurements on Shop Drawings.

## 1.10 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of aluminum-framed systems that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

- 1. Failures include, but are not limited to, the following:
  - a. Structural failures including, but not limited to, excessive deflection.
  - b. Noise or vibration caused by thermal movements.
  - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
  - d. Water leakage through fixed glazing and framing areas.
  - e. Failure of operating components.

- 2. Warranty Period: Five years from date of Substantial Completion.

- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes do not comply with requirements or that fail in materials or workmanship within specified warranty period. Warranty does not include normal weathering.

- 1. Warranty Period: 10 years from date of Substantial Completion.

## 1.11 MAINTENANCE SERVICE

- A. Entrance Door Hardware:

- 1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide "Encore" thermal framing system with wide stile thermal entrance doors as manufactured by Kawneer North America; an Alcoa company or comparable product by one of the following:

- 1. EFCO Corporation.
- 2. Kawneer North America; an Alcoa company.
- 3. Vistawall Architectural Products; The Vistawall Group; a Bluescope Steel company.

### 2.2 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
3. Extruded Structural Pipe and Tubes: ASTM B 429.
4. Structural Profiles: ASTM B 308/B 308M.

B. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer, complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.

1. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
2. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
3. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

## 2.3 FRAMING SYSTEMS

A. Framing Members: Manufacturer's standard extruded-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: As indicated.

B. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

C. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Do not use exposed fasteners.

D. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts, complying with ASTM A 123/A 123M or ASTM A 153/A 153M.

E. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

F. Framing System Gaskets and Sealants: Manufacturer's standard, recommended by manufacturer for joint type.

## 2.4 GLAZING SYSTEMS

A. Glazing: As specified in Section 08 80 00 "Glazing."

B. Glazing Gaskets: Manufacturer's standard compression types; replaceable, molded or extruded, of profile and hardness required to maintain watertight seal.

C. Spacers and Setting Blocks: Manufacturer's standard elastomeric type.

1. Weatherseal Sealant: ASTM C 920 for Type S, Grade NS, Class 25, Uses NT, G, A, and O; single-component neutral-curing formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and aluminum-framed-system manufacturers for this use.

## 2.5 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
1. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch- (3.2-mm) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
    - a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
  2. Door Design: Wide stile; 5-inch (127-mm) nominal width, with mid-rail.
    - a. Accessible Doors: Smooth surfaced for width of door in area within 10 inches (255 mm) above floor or ground plane.
  3. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.

## 2.6 ENTRANCE DOOR HARDWARE

- A. General: Provide entrance door hardware for each entrance door to comply with requirements in this Section and Section 08 71 00, "Door Hardware."
1. Provide manufacturer's heavy duty hardware units as indicated, scheduled or required for operation or required by authorities having jurisdiction.
  2. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated, or named manufacturers' products.
  3. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
  4. Opening-Force Requirements:
    - a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N) to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
    - b. Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.
- B. Opening-Force Requirements:
1. Latches and Exit Devices: Not more than 15 lbf (67 N) required to release latch.
- C. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.
- D. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to meet field conditions and requirements for opening force.
- E. Concealed Overhead Holders: Provide center pivoted single-acting overhead concealed closers with bottom pivot; comply with BHMA A156.4, Grade 1. Comply with manufacturer's recommendations for size of closer, depending on door size, exposure to weather and anticipated frequency of use. Include automatic hold open feature.
- F. Surface-Mounted Holders: BHMA A156.16, Grade 1.
- G. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.
- H. Weather Stripping: Manufacturer's standard replaceable components.

1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
  2. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.
- I. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
  - J. Silencers: BHMA A156.16, Grade 1.
  - K. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch (13 mm).
  - L. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

## 2.7 ACCESSORY MATERIALS

- A. Joint Sealants: For installation at perimeter of aluminum-framed systems, as specified in Section 07 92 00 "Joint Sealants."
- B. Bituminous Paint: Cold-applied, asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos; formulated for 30-mil (0.762-mm) thickness per coat.

## 2.8 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Framing Members, General: Fabricate components that, when assembled, have the following characteristics:
  1. Profiles that are sharp, straight, and free of defects or deformations.
  2. Accurately fitted joints with ends coped or mitered.
  3. Means to drain water passing joints, condensation within framing members, and moisture migrating within the system to exterior.
  4. Physical and thermal isolation of glazing from framing members.
  5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  6. Provisions for field replacement of glazing from exterior.
  7. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- C. Mechanically Glazed Framing Members: Fabricate for glazing without projecting stops.
- D. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
  1. At exterior doors, provide compression weather stripping at fixed stops.
  2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- E. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
  1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
  2. At exterior doors, provide weather sweeps applied to door bottoms.

- F. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.9 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
  - 1. Match appearance of aluminum curtain wall finish.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 INSTALLATION

- A. General:
  - 1. Comply with manufacturer's written instructions.
  - 2. Do not install damaged components.
  - 3. Fit joints to produce hairline joints free of burrs and distortion.
  - 4. Rigidly secure nonmovement joints.
  - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration.
  - 6. Seal joints watertight unless otherwise indicated.
- B. Metal Protection:
  - 1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or applying sealant or tape, or by installing nonconductive spacers as recommended by manufacturer for this purpose.
  - 2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.
- C. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within the system to exterior.
- D. Set continuous sill members and flashing in full sealant bed as specified in Section 07 92 00 "Joint Sealants" to produce weathertight installation.
- E. Install components plumb and true in alignment with established lines and grades, and without warp or rack.
- F. Install glazing as specified in Section 08 80 00 "Glazing."
- G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
  - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.

2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.
- H. Install perimeter joint sealants as specified in Section 07 92 00 "Joint Sealants" to produce weathertight installation.

### 3.3 ERECTION TOLERANCES

- A. Install aluminum-framed systems to comply with the following maximum erection tolerances:
1. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3 mm in 3.7 m); 1/4 inch (6 mm) over total length.
  2. Alignment:
    - a. Where surfaces abut in line, limit offset from true alignment to 1/16 inch (1.5 mm).
    - b. Where surfaces meet at corners, limit offset from true alignment to 1/32 inch (0.8 mm).
- B. Diagonal Measurements: Limit difference between diagonal measurements to 1/8 inch (3 mm).

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections.
- B. Testing Services: Testing and inspecting of representative areas to determine compliance of installed systems with specified requirements shall take place as follows and in successive phases as indicated on Drawings. Do not proceed with installation of the next area until test results for previously completed areas show compliance with requirements.
1. Water Spray Test: Before installation of interior finishes has begun, a minimum area of 75 feet (23 m) by 1 story of aluminum-framed systems designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
- C. Repair or remove work if test results and inspections indicate that it does not comply with specified requirements.
- D. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- E. Aluminum-framed assemblies will be considered defective if they do not pass tests and inspections.
- F. Prepare test and inspection reports.

### 3.5 ADJUSTING

- A. Adjust operating entrance door hardware to function smoothly as recommended by manufacturer.

3.6 HARDWARE SETS

HW SET: AL-01

EACH TO HAVE:

ALL HDWE. BY DR. MFG.

HW SET: AL-02

EACH TO HAVE:

2	EA	CONT. HINGE	112HD EPT	628	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC DEVICE	RX-QEL+-9849-DT-990	626	VON
1	EA	ELEC PANIC DEVICE	RX-QEL+-SD-9849-NL-990	626	VON
2	EA	RIM CYLINDER	80-159	626	SCH
2	EA	PERMANENT CORE	1CP7 (BY SECTION 08 70 00)	626	BES
2	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA ST-2731TBWMS	689	LCN
1	EA	SURF. AUTO OPERATOR	4642 RH (LHR DR. LEAF) (SEE NOTE)	689	LCN
2	EA	WALL ACTUATOR	8310-3856WS (WIRELESS)	630	LCN
2	EA	RF RECEIVER	8310-865	BLU	LCN
2	EA	FLOOR STOP	FS18S	BLK	IVE
2	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	655A MSLA-10	AL	ZER
2	EA	DR. POS. SWITCH	1076CW	TAN	SEN
1	EA	POWER SUPPLY	PS914 900-BBK 900-4RL	LGR	VON
1	SET	WEATHERSTRIP	(WITH FRAME AND DOORS)		
1	EA	WIRING DIAGRAM	POINT TO POINT SYSTEM		VON
		CARD READER	(BY SECURITY CONTRACTOR)		

NOTE: INSTALL OVERHEAD STOPS FIRST THEN CLOSER AND AUTO. OPERATOR WITH TOP HEADER CEILING MOUNT TO CLEAR O.H. STOP. AUTO. OPERATOR ARM MUST BE THRU BOLTED TO DOOR.

HW SET: AL-02A

EACH TO HAVE:

2	EA	CONT. HINGE	112HD EPT	628	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC DEVICE	RX-QEL+-9849-DT-990	626	VON
1	EA	ELEC PANIC DEVICE	RX-QEL+-SD-9849-NL-990	626	VON
1	EA	MORTISE CYLINDER	80-132 GRN	626	SCH
2	EA	RIM CYLINDER	80-159	626	SCH
3	EA	PERMANENT CORE	1CP7 (BY SECTION 08 70 00)	626	BES
2	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA ST-2731TBWMS	689	LCN
1	EA	SURF. AUTO OPERATOR	4642 LH (RHR DR. LEAF) (SEE NOTE)	689	LCN
2	EA	WALL ACTUATOR	8310-3856WS (WIRELESS)	630	LCN
2	EA	RF RECEIVER	8310-865	BLU	LCN
1	EA	MOUNTING PLATE	9540-18	689	LCN
2	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	655A MSLA-10	AL	ZER
1	EA	KEYSWITCH	653-04 NS L2	630	SCE
2	EA	DR. POS. SWITCH	1076CW	TAN	SEN
1	EA	POWER SUPPLY	PS914 900-BBK 900-4RL	LGR	VON
1	SET	WEATHERSTRIP	(WITH FRAME AND DOORS)		
1	EA	WIRING DIAGRAM	POINT TO POINT SYSTEM		VON

NOTE: INSTALL OVERHEAD STOPS FIRST THEN CLOSER AND AUTO. OPERATOR WITH TOP HEADER CEILING MOUNT TO CLEAR O.H. STOP. AUTO. OPERATOR ARM MUST BE THRU BOLTED TO DOOR.

HW SET: AL-03 (NOT USED)

HW SET: AL-03A

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	628	IVE
1	EA	ELEC. PANIC DEVICE	RX-QEL+-SD-98-NL-990	626	VON
1	EA	MORTISE CYLINDER	80-132 GRN	626	SCH
2	EA	RIM CYLINDER	80-159	626	SCH
3	EA	PERMANENT CORE	1CP7 (BY SECTION 08 70 00)	626	BES
1	EA	AUTO. OPERATOR	9542 MS	ANCLR	LCN
2	EA	WALL ACTUATOR	8310-3853TWS	630	LCN
1	EA	ROCKER SWITCH	8310-806R	689	LCN
2	EA	RF RECEIVER	8310-865	BLU	LCN
1	EA	MOUNTING PLATE	9540-18	689	LCN
1	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	8655A 36" MSLA-10	AL	ZER
1	EA	KEYSWITCH	653-04 NS L2	630	SCE
1	EA	POWER SUPPLY	PS914 900-BBK 900-4RL	LGR	VON
1	SET	WEATHERSTRIP	(WITH FRAME AND DOORS)		
1	EA	WIRING DIAGRAM	POINT TO POINT SYSTEM		VON

HW SET: GL-01

EACH TO HAVE:

1	EA	PIVOT SET	7255 SET	626	IVE
1	EA	MAGNETIC LOCK	M452P	628	SCE
2	SET	DOOR PULLS	(2 EA.) DT1214 36" B3 B. TO B. MTG.	630	FOR
1	EA	CONCEALED CLOSER	2011 BUMP	689	LCN
1	EA	CONC. AUTO OPERATOR	2811 STD/CP DD POS MP	ANCLR	LCN
2	EA	WALL ACTUATOR	8310-3856WS (WIRELESS)	630	LCN
2	EA	RF RECEIVER	8310-865	BLU	LCN
2	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	PUSHBUTTON	623RD DA NS L2/ILL	629	SCE
1	EA	MOTION SENSOR	SCANII	WHT	SCE
1	EA	POWER SUPPLY	PS904 900-BBK 900-4R-FA	LGR	SCE
1	EA	WIRING DIAGRAM	POINT TO POINT SYSTEM		SCE

NOTE: VERIFY HEAD AND JAMB DETAILS.

NOTE: FLOOR STOPS TO BE INSTALLED CLOSE TO DOOR JAMBS TO PREVENT TRIPPING HAZARD.

NOTE: AUTOMATIC DOOR OPERATOR HAS BOTTOM PIVOT AND TOP ARM ASSEMBLY FOR ACTIVE DOOR LEAF. INACTIVE DOOR LEAF TO HAVE SEPARATE TOP AND BTM. PIVOTS.

HW SET: GL-02

EACH TO HAVE:

1	EA	BTM PIVOT	INT403	630	CRL
1	EA	BTM DR. PATCH	PH10CBS	630	CRL
2	EA	TOP DR. PATCH	PH20ABS	630	CRL
1	EA	TRNS TOP PATCH	PH40BS (WITH DR. PIVOT INT300)	630	CRL
1	EA	TRNS TOP PATCH	PH40BS (WITH DR. STOP 1NT306)	630	CRL
1	EA	GLASS LOCK	DT36BS (CENTER MOUNT)	630	CRL
1	EA	LEVER TURN	09-900 X XB11-720	626	SCH
1	EA	MORTISE CYLINDER	80-132 GRN	626	SCH
1	EA	PERMANENT CORE	1CP7 (BY SECTION 08 70 00)	626	BES
1	EA	GLASS LOCK STRIKE	DTK36BS (CENTER MOUNT)	630	CRL
1	SET	DOOR PULLS	(2 EA.) DT1214 36" B3 B. TO B. MTG.	630	FOR
1	EA	FLOOR STOP	FS18S	BLK	IVE

NOTE: GLASS DOOR LOCK AND GLASS WALL STRIKE MOUNTED AT 40" ABOVE FINISH FLOOR LEVEL. SPECIAL CUT OUT IN DOOR AND GLASS WALL REQUIRED.  
ADJUST PULLS IN GLASS FOR CLEARANCE TO OPERATE KEY IN CYLINDER AND LEVER TURN INSIDE.

HW SET: GL-03

EACH TO HAVE:

1	EA	BTM PIVOT	INT403	630	CRL
1	EA	BTM DR. PATCH	PH10CBS	630	CRL
2	EA	TOP DR. PATCH	PH20ABS	630	CRL
1	EA	TRNS TOP PATCH	PH40BS (WITH DR. PIVOT INT300)	630	CRL
1	EA	TRNS TOP PATCH	PH40BS (WITH DR. STOP 1NT306)	630	CRL
1	SET	DOOR PULLS	(2 EA.) DT1214 36" B3 B. TO B. MTG.	630	FOR
1	EA	FLOOR STOP	FS18S	BLK	IVE

NOTE: VERIFY HEAD AND JAMB DETAILS.

END OF SECTION 08 41 13

SECTION 08 42 29

SLIDING AUTOMATIC ENTRANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes exterior, sliding, power-operated automatic entrances.

1.3 DEFINITIONS

- A. AAADM: American Association of Automatic Door Manufacturers.
- B. Activation Device: A control that, when actuated, sends an electrical signal to the door operator to open the door.
- C. IBC: International Building Code.
- D. Safety Device: A control that, to avoid injury, prevents a door from opening or closing.
- E. For automatic door terminology, refer to BHMA A156.10 for definitions of terms.

1.4 COORDINATION

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

1.5 PREINSTALLATION MEETINGS

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

1.6 ACTION SUBMITTALS

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

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for automatic entrances.
  2. Include rated capacities, operating characteristics, electrical characteristics, and furnished specialties and accessories.
- B. Shop Drawings: For automatic entrances.
1. Include plans, elevations, sections, hardware mounting heights, and attachment details.
  2. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
  3. Include diagrams for power, signal, and control wiring.
  4. Indicate locations of activation and safety devices.
  5. Include hardware schedule and indicate hardware types, functions, quantities, and locations.
- C. Samples for Initial Selection: For units with factory-applied finishes.
1. Include Samples of hardware and accessories involving color or finish selection.
- D. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- E. Delegated-Design Submittal: For automatic entrances.

#### 1.7 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Certificates: Include emergency-exit features of automatic entrances serving as a required means of egress.
- C. Sample Warranties: For manufacturer's special warranties.

#### 1.8 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For automatic entrances, safety devices, and control systems to include in operation and maintenance manuals.

#### 1.9 QUALITY ASSURANCE

- A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation and maintenance of units required for this Project.

#### 1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of automatic entrances that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Faulty operation of operators, controls, and hardware.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering and use.
  2. Warranty Period: Two years from date of Substantial Completion.

- B. Special Finish Warranty: Manufacturer agrees to repair or replace components on which finishes fail in materials or workmanship within specified warranty period.
  - 1. Deterioration includes, but is not limited to, the following:
    - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
    - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
    - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
  - 2. Warranty Period: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 AUTOMATIC ENTRANCE ASSEMBLIES

- A. Source Limitations: Obtain sliding automatic entrances from single source from single manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
- C. Power-Operated Door Standard: BHMA A156.10.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 40 00 "Quality Requirements," to design automatic entrances.
- B. Structural Performance: Automatic entrances shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated according to ASCE/SEI 7.
  - 1. Seismic Loads: As indicated in "Design Criteria," Structural Drawing sheet S1011.
  - 2. Wind Loads: As indicated in "Design Criteria," Structural Drawing sheet S1011.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. Air Infiltration: Maximum air leakage through fixed glazing and framing areas of 1.25 cfm/sq. ft. (6.4 L/s x sq. m) of fixed entrance-system area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa).
- E. Opening Force:
  - 1. Power-Operated Doors: Not more than 50 lbf (222 N) required to manually set door in motion if power fails, and not more than 15 lbf (67 N) required to open door to minimum required width.
  - 2. Breakaway Device for Power-Operated Doors: Not more than 50 lbf (222 N) required for a breakaway door or panel to open.

### 2.3 SLIDING AUTOMATIC ENTRANCES

- A. General: Provide manufacturer's standard automatic entrances including doors, sidelites, framing, headers, carrier assemblies, roller tracks, door operators, controls, and accessories required for a complete installation.
- B. Sliding Automatic Entrance:

1. Basis-of-Design Product: Subject to compliance with requirements, provide "Overhead Concealed Fixed Sidelite – Medium Stile," double automatic door system as manufactured by Besam Assa Abloy or comparable product by one of the following:
  - a. Besam Entrance Solutions; Subsidiary of ASSA ABLOY Entrance Systems.
  - b. DORMA Automatics; Division of DORMA Group North America.
  - c. Horton Automatics; a division of Overhead Door Corporation.
  - d. Stanley Access Technologies, LLC; Division of Stanley Security Solutions.
2. Configuration: Biparting-sliding doors with two sliding leaves and sidelites on each side.
  - a. Emergency Breakaway Capability: Sliding leaves only.
  - b. Mounting: Between jambs.
3. Operator Features:
  - a. Power opening and closing.
  - b. Drive System: Chain or belt.
  - c. Adjustable opening and closing speeds.
  - d. Adjustable hold-open time between zero and 30 seconds.
  - e. Obstruction recycle.
  - f. On-off/hold-open switch to control electric power to operator, key operated.
4. Sliding-Door Carrier Assemblies and Overhead Roller Tracks: Carrier assembly that allows vertical adjustment; consisting of nylon- or delrin-covered, ball-bearing-center steel wheels operating on a continuous roller track, or ball-bearing-center steel wheels operating on a nylon- or delrin-covered, continuous roller track. Support doors from carrier assembly by cantilever and pivot assembly.
5. Sliding-Door Threshold: Threshold members and bottom-guide-track system with stainless-steel, ball-bearing-center roller wheels.
  - a. Configuration: Saddle-type threshold across door opening and surface-mounted guide-track system at sidelites.
6. Controls: Activation and safety devices according to BHMA standards.
  - a. Activation Device: Motion sensor mounted on each side of door header to detect pedestrians in activating zone and to open door.
  - b. Safety Device: Two photoelectric beams mounted in sidelite jambs on each side of door to detect pedestrians in presence zone and to prevent door from closing.
7. Finish: Finish framing, door(s), and header with Class I, clear anodic finish matching adjacent storefront.

#### 2.4 ENTRANCE COMPONENTS

- A. Framing Members: Extruded aluminum, minimum 0.125 inch (3.2 mm) thick and reinforced as required to support imposed loads.
  1. Nominal Size: As indicated on Drawings.
  2. Muntin Bars: Horizontal tubular rail member for each door; match stile design and finish.
- B. Headers: Fabricated from minimum 0.125-inch- (3.2-mm-) thick extruded aluminum and extending full width of automatic entrance units to conceal door operators and controls. Provide hinged or removable access panels for service and adjustment of door operators and controls. Secure panels to prevent unauthorized access.

1. Mounting: Concealed, with one side of header flush with framing.
  2. Capacity: Capable of supporting doors up to 175 lb (79 kg) per leaf over spans up to 14 feet (4.3 m) without intermediate supports.
- C. Brackets and Reinforcements: High-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- D. Signage: As required by cited BHMA standard.
1. Application Process: Door manufacturer's standard process.

## 2.5 MATERIALS

- A. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
1. Extrusions: ASTM B 221 (ASTM B 221M).
  2. Sheet: ASTM B 209 (ASTM B 209M).
- B. Steel Reinforcement: Reinforcement with corrosion-resistant primer complying with SSPC-PS Guide No. 12.00 applied immediately after surface preparation and pretreatment. Use surface preparation methods according to recommendations in SSPC-SP COM and prepare surfaces according to applicable SSPC standard.
- C. Glazing: As specified in Section 08 80 00 "Glazing."
- D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.
- E. Fasteners and Accessories: Corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

## 2.6 DOOR OPERATORS AND CONTROLS

- A. General: Provide operators and controls, which include activation and safety devices, according to BHMA standards, for condition of exposure, and for long-term, maintenance-free operation under normal traffic load for type of occupancy indicated.
- B. Door Operators: Provide door operators of size recommended by manufacturer for door size, weight, and movement.
1. Door Operator Performance: Door operators shall open and close doors and maintain them in fully closed position when subjected to Project's design wind loads.
  2. Electromechanical Operators: Concealed, self-contained, overhead unit powered by fractional-horsepower, permanent-magnet dc motor; with closing speed controlled mechanically by gear train and dynamically by braking action of electric motor; with solid-state microprocessor controller; UL 325; and with manual operation with power off.
- C. Motion Sensors: Self-contained, K-band-frequency, microwave-scanner units; fully enclosed by its plastic housing; adjustable to provide detection-field sizes and functions required by BHMA A156.10.
- D. Photoelectric Beams: Pulsed infrared, sender-receiver assembly for recessed mounting. Beams shall not be active when doors are fully closed.
- E. Electrical Interlocks: Unless units are equipped with self-protecting devices or circuits, provide electrical interlocks to prevent activation of operator when door is locked, latched, or bolted.

## 2.7 HARDWARE

- A. General: Provide units in sizes and types recommended by automatic entrance and hardware manufacturers for entrances and uses indicated. Finish exposed parts to match door finish.
- B. Breakaway Device for Power-Operated Doors: Device that allows door to swing out in direction of egress to full 90 degrees from any operating position. Maximum force to open door shall be as stipulated in "Performance Requirements" Article. Interrupt powered operation of door operator while in breakaway mode.
- C. Deadlocks: Deadbolt operated by exterior cylinder and interior thumb turn, with minimum 1-inch- (25-mm-) long throw bolt; BHMA A156.5, Grade 1.
  - 1. Cylinders: As specified in Section 08 71 00 "Door Hardware."
    - a. Keying: Integrate into building master key system.
  - 2. Include concealed, vertical-rod exit devices, UL 305, with latching into threshold and overhead carrier assembly and released by full-width panic bar; and that prevent emergency breakaway doors from swinging unless released to permit emergency egress.
- D. Weather Stripping: Replaceable components.
  - 1. Sliding Type: AAMA 701, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

## 2.8 FABRICATION

- A. General: Factory fabricate automatic entrance components to designs, sizes, and thicknesses indicated and to comply with indicated standards.
  - 1. Form aluminum shapes before finishing.
  - 2. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
  - 3. Use concealed fasteners to greatest extent possible. Where exposed fasteners are required, use countersunk Phillips flat-head machine screws, fabricated from stainless steel.
    - a. Where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration, use self-locking devices.
    - b. Reinforce members as required to receive fastener threads.
  - 4. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
- B. Framing: Provide automatic entrances as prefabricated assemblies. Complete fabrication, assembly, finishing, hardware application, and other work before shipment to Project site.
  - 1. Fabricate tubular and channel frame assemblies with welded or mechanical joints. Provide subframes and reinforcement as required for a complete system to support required loads.
  - 2. Perform fabrication operations in manner that prevents damage to exposed finish surfaces.
  - 3. Form profiles that are sharp, straight, and free of defects or deformations.
  - 4. Provide components with concealed fasteners and anchor and connection devices.
  - 5. Fabricate components with accurately fitted joints with ends coped or mitered to produce hairline joints free of burrs and distortion.
  - 6. Fabricate exterior components to drain condensation and water passing joints within system to the exterior.

7. Provide anchorage and alignment brackets for concealed support of assembly from building structure.
  8. Allow for thermal expansion of exterior units.
- C. Doors: Factory fabricated and assembled in profiles indicated. Reinforce as required to support imposed loads and for installing hardware.
- D. Door Operators: Factory fabricated and installed in headers, including adjusting and testing.
- E. Glazing: Fabricate framing with minimum glazing edge clearances for thickness and type of glazing indicated, according to GANA's "Glazing Manual."
- F. Hardware: Factory install hardware to greatest extent possible; remove only as required for final finishing operation and for delivery to and installation at Project site. Cut, drill, and tap for factory-installed hardware before applying finishes.
1. Provide sliding-type weather stripping, mortised into door, at perimeter of doors.
- G. Controls:
1. General: Factory install activation and safety devices in doors and headers as required by BHMA A156.10 for type of door and direction of travel.
  2. Install photoelectric beams in vertical jambs of sidelites, with dimension above finished floor as follows:
    - a. Top Beam: 48 inches (1219 mm).
    - b. Bottom Beam: 24 inches (610 mm).

## 2.9 GENERAL FINISH REQUIREMENTS

- A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
1. Match finish appearance of adjacent Storefront.

## 2.10 ALUMINUM FINISHES

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances, header support, and other conditions affecting performance of automatic entrances.
- B. Examine roughing-in for electrical systems to verify actual locations of power connections before automatic entrance installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. General: Install automatic entrances according to manufacturer's written instructions and cited BHMA standard for direction of pedestrian travel, including signage, controls, wiring, and connection to the building's power supply.
  - 1. Do not install damaged components. Fit frame joints to produce hairline joints free of burrs and distortion. Rigidly secure nonmovement joints. Seal joints watertight.
  - 2. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.
  - 3. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous coating.
- B. Entrances: Install automatic entrances plumb and true in alignment with established lines and grades without warp or rack of framing members and doors. Anchor securely in place.
  - 1. Install surface-mounted hardware using concealed fasteners to greatest extent possible.
  - 2. Set headers, carrier assemblies, tracks, operating brackets, and guides level and true to location with anchorage for permanent support.
  - 3. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within system to exterior.
  - 4. Level recesses for recessed thresholds using nonshrink grout.
- C. Door Operators: Connect door operators to electrical power distribution system.
- D. Access-Control Devices: Connect access-control devices to University access-control system as specified in Division 28.
- E. Controls: Install and adjust activation and safety devices according to manufacturer's written instructions and cited BHMA standard for direction of pedestrian travel. Connect control wiring according to Section 26 05 19 "Low-Voltage Electrical Power Conductors and Cables."
- F. Glazing: Install glazing as specified in Section 08 80 00 "Glazing."
- G. Sealants: Comply with requirements specified in Section 07 92 00 "Joint Sealants" to provide weathertight installation.
  - 1. Set thresholds, framing members and flashings in full sealant bed.
- H. Signage: Apply signage on both sides of each door as required by cited BHMA standard for direction of pedestrian travel.
- I. Wiring within Automatic Entrance Enclosures: Bundle, lace, and train conductors to terminal points with no excess and without exceeding manufacturer's written limitations on bending radii. Provide and use lacing bars and distribution spools.

### 3.3 FIELD QUALITY CONTROL

- A. Perform the following tests and inspections with the assistance of a factory-authorized service representative:
  - 1. Test and inspect each automatic entrance, using AAADM inspection forms, to determine compliance of installed systems with applicable BHMA standards.
- B. Automatic entrances will be considered defective if they do not pass tests and inspections.
- C. Prepare test and inspection reports.

3.4 ADJUSTING

- A. Adjust hardware, moving parts, door operators, and controls to function smoothly, and lubricate as recommended by manufacturer; comply with requirements of applicable BHMA standards.
  - 1. Adjust exterior doors for weathertight closure.
- B. Readjust door operators and controls after repeated operation of completed installation equivalent to three days' use by normal traffic (100 to 300 cycles).

3.5 CLEANING

- A. Clean glass and metal surfaces promptly after installation. Remove excess glazing and sealant compounds, dirt, and other substances. Repair damaged finish to match original finish.

3.6 DEMONSTRATION

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

END OF SECTION 08 42 29

SECTION 08 51 13

ALUMINUM WINDOWS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes operable aluminum windows for exterior locations.
- B. Related Requirements:
  - 1. Section 08 41 13 "Aluminum-Framed Entrances and Storefronts" for coordinating finish among aluminum fenestration units.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
  - 2. Review and discuss the finishing of aluminum windows that is required to be coordinated with the finishing of other aluminum work for color and finish matching.
  - 3. Review, discuss, and coordinate the interrelationship of aluminum windows with other exterior wall components. Include provisions for anchorage, flashing, sealing perimeters, and protecting finishes.
  - 4. Review and discuss the sequence of work required to construct a watertight and weathertight exterior building envelope.
  - 5. Inspect and discuss the condition of substrate and other preparatory work performed by other trades.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, glazing and fabrication methods, dimensions of individual components and profiles, hardware, and finishes for aluminum windows.
- B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
- C. Samples for Verification: For aluminum windows and components required, showing full range of color variations for finishes, and prepared on Samples of size indicated below:
  - 1. Exposed Finishes: 2 by 4 inches (50 by 100 mm).
  - 2. Exposed Hardware: Full-size units.
- D. Product Schedule: For aluminum windows. Use same designations indicated on Drawings.

## 1.5 INFORMATIONAL SUBMITTALS

- A. Sample Warranties: For manufacturer's warranties.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: An installer acceptable to aluminum window manufacturer for installation of units required for this Project.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockup of typical wall area as shown on Drawings.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

## 1.7 WARRANTY

- A. Manufacturer's Warranty: Manufacturer agrees to repair or replace aluminum windows that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Failure to meet performance requirements.
    - b. Structural failures including excessive deflection, water leakage, condensation, and air infiltration.
    - c. Faulty operation of movable sash and hardware.
    - d. Deterioration of materials and finishes beyond normal weathering.
    - e. Failure of insulating glass.
  - 2. Warranty Period:
    - a. Window: 10 years from date of Substantial Completion.
    - b. Glazing Units: Five years from date of Substantial Completion.
    - c. Aluminum Finish: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. EFCO Corporation.
  - 2. Kawneer North America; an Alcoa company.
  - 3. Thermal Windows, Inc.
- B. Source Limitations: Obtain aluminum windows from single source from single manufacturer.

### 2.2 WINDOW PERFORMANCE REQUIREMENTS

- A. Product Standard: Comply with AAMA/WDMA/CSA 101/1.S.2/A440 for definitions and minimum standards of performance, materials, components, accessories, and fabrication unless more stringent requirements are indicated.

1. Window Certification: AMMA certified with label attached to each window.
- B. Performance Class and Grade: AAMA/WDMA/CSA 101/I.S.2/A440 as follows:
  1. Minimum Performance Class: AW.
  2. Minimum Performance Grade: 45.
- C. Thermal Movements: Provide aluminum windows, including anchorage, that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C) material surfaces.

## 2.3 ALUMINUM WINDOWS

- A. Operating Types: Provide the following operating types in locations indicated on Drawings:
  1. Casement: Project out.
- B. Frames and Sashes: Aluminum extrusions complying with AAMA/WDMA/CSA 101/I.S.2/A440.
  1. Thermally Improved Construction: Fabricate frames, sashes, and muntins with an integral, concealed, low-conductance thermal barrier located between exterior materials and window members exposed on interior side in a manner that eliminates direct metal-to-metal contact.
- C. Insulating-Glass Units: ASTM E 2190.
  1. Glass: ASTM C 1036, Type 1, Class 1, q3.
    - a. Tint: Clear.
    - b. Kind: Fully tempered.
  2. Lites: Number of lites as indicated.
  3. Low-E Coating: Pyrolytic on second surface.
- D. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.
- E. Hardware, General: Provide manufacturer's standard hardware fabricated from aluminum, stainless steel, carbon steel complying with AAMA 907, or other corrosion-resistant material compatible with adjacent materials; designed to smoothly operate, tightly close, and securely lock windows, and sized to accommodate sash weight and dimensions.
  1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.
- F. Projected Window Hardware:
  1. Gear-Type Rotary Operators: Complying with AAMA 901 when tested according to ASTM E 405, Method A. Provide operators that function without requiring the removal of interior screens or using screen wickets.
  2. Hinges: Non-friction type, not less than two per sash.
  3. Limit Devices: Manufacturer's standard limit devices designed to restrict sash opening.
    - a. Limit clear opening to 4 inches (100 mm) for ventilation; with custodial key release.

## 2.4 INSECT SCREENS

- A. General: Fabricate insect screens to integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
  - 1. Type and Location: Full, inside for project-out sashes.
- B. Aluminum Frames: Manufacturer's standard aluminum alloy complying with SMA 1004 or SMA 1201. Fabricate frames with mitered or coped joints or corner extrusions, concealed fasteners, and removable PVC spline/anchor concealing edge of frame.
- C. Glass-Fiber Mesh Fabric: Manufacturer's standard mesh of PVC-coated, glass-fiber threads; woven and fused to form a fabric mesh resistant to corrosion, shrinkage, stretch, impact damage, and weather deterioration. Comply with ASTM D 3656.
  - 1. Mesh Color: Manufacturer's standard.

## 2.5 FABRICATION

- A. Fabricate aluminum windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
- B. Glaze aluminum windows in the factory.
- C. Weather strip each operable sash to provide weathertight installation.
- D. Weep Holes: Provide weep holes and internal passages to conduct infiltrating water to exterior.
- E. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation.

## 2.6 GENERAL FINISH REQUIREMENTS

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

## 2.7 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Class II, Clear Anodic Finish: AA-M12C22A31 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class II, clear coating 0.010 mm or thicker) complying with AAMA 611.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine openings, substrates, structural support, anchorage, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify rough opening dimensions, levelness of sill plate, and operational clearances.
- C. Examine wall flashings, vapor retarders, water and weather barriers, and other built-in components to ensure weathertight window installation.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
- B. Install windows level, plumb, square, true to line, without distortion or impeding thermal movement, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
- C. Install windows and components to drain condensation, water penetrating joints, and moisture migrating within windows to the exterior.
- D. Separate aluminum and other corrodible surfaces from sources of corrosion or electrolytic action at points of contact with other materials.

### 3.3 ADJUSTING, CLEANING, AND PROTECTION

- A. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.
- B. Clean exposed surfaces immediately after installing windows. Avoid damaging protective coatings and finishes. Remove excess sealants, glazing materials, dirt, and other substances.
  - 1. Keep protective films and coverings in place until final cleaning.
- C. Remove and replace glass that has been broken, chipped, cracked, abraded, or damaged during construction period.
- D. Protect window surfaces from contact with contaminating substances resulting from construction operations. If contaminating substances do contact window surfaces, remove contaminants immediately according to manufacturer's written instructions.

END OF SECTION 08 51 13

SECTION 08 63 00

METAL-FRAMED SKYLIGHTS

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes aluminum-framed skylights with the following characteristics:

1. Glazing is glass.

1.2 PERFORMANCE REQUIREMENTS

A. Provide metal-framed skylights, including anchorage, capable of withstanding, without failure, the effects of the following:

1. Structural loads.
2. Thermal movements.
3. Movements of supporting structure.
4. Dimensional tolerances of building frame and other adjacent construction.

B. Failure includes the following:

1. Deflection exceeding specified limits.
2. Water leakage.
3. Thermal stresses transferred to building structure.
4. Noise or vibration created by wind and thermal and structural movements.
5. Framing members transferring stresses, including those caused by thermal and structural movements, to glazing.
6. Loosening or weakening of fasteners, attachments, and other components.
7. Sealant failure.

C. Structural Loads:

1. Wind Loads: As indicated by structural design data on Drawings.
2. Concentrated Live Loads: 250 lbf (1112 N) applied to framing members at locations that will produce greatest stress or deflection.
3. Seismic Loads: As indicated by earthquake design data on Drawings.
4. Load Combinations: Calculate according to requirements of applicable code indicated on Drawings.

D. Deflection of Framing Members:

1. Deflection Normal to Glazing Plane:
  - a. Spans Up to 20 Feet (6 m): Limited to 1/175 of clear span or 1 inch (25.4 mm), whichever is smaller.
  - b. Spans Exceeding 20 Feet (6 m): Limited to 1/240 of clear span.
  - c. Glass Edge Deflection: Limit edge deflection of individual glass lites to 3/4 inch (19 mm).
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

- E. Lateral Bracing of Framing Members: Compression flanges of flexural members are laterally braced by cross members with minimum depth equal to 50 percent of flexural member that is braced. Glazing does not provide lateral support.
- F. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- G. Skylight Framing: Non-combustible (in accordance with IBC 2405.4).

### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittal:
  - 1. Product Data for Credit EQ 4.1: For sealants used inside of the weatherproofing system, including printed statement of VOC content.
- C. Shop Drawings: For assemblies. Include plans, elevations, sections, details, and attachments to other work.
  - 1. Include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- D. Samples: For each exposed finish.
- E. Compatibility Test Reports: For structural-sealant-glazed skylights, preconstruction test reports from structural- and nonstructural-sealant manufacturer. Include sealant manufacturer's interpretation of test results for sealant performance and written recommendations for primers and substrate preparation needed for adhesion.
- F. Field quality-control test reports.
- G. Product test reports.
- H. Maintenance data.
- I. Special warranties specified in this Section.

### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: Entity capable of assuming engineering responsibility and performing work of this Section and who is acceptable to manufacturer.
- B. Structural-Sealant Glazing: Comply with recommendations in ASTM C 1401, "Guide for Structural Sealant Glazing," for joint design and quality-control procedures.

### 1.5 PROJECT CONDITIONS

- A. Field Measurements: Indicate measurements on Shop Drawings.

## 1.6 WARRANTY

- A. Special Assembly Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal-framed skylights that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration caused by thermal movements.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - d. Adhesive or cohesive sealant failures.
    - e. Water leakage.
  - 2. Warranty Period: 10 years from date of Substantial Completion.
- B. Special Finish Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components on which finishes fail within specified warranty period. Warranty does not include normal weathering.
  - 1. Failures include, but are not limited to, checking, crazing, peeling, chalking, and fading of finishes.
  - 2. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: The design for metal-framed skylights is based on Naturalite Skylight Systems; Vistawall Group (The), BMS-3000 extruded aluminum framing system. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:
  - 1. Bristolite Skylights.
  - 2. Naturalite Skylight Systems; Vistawall Group (The).
  - 3. Skyline Products, Inc.
  - 4. Wasco Products, Inc.

### 2.2 FRAMING SYSTEMS

- A. Aluminum: Alloy and temper recommended in writing by manufacturer for type of use and finish indicated.
  - 1. Sheet and Plate: ASTM B 209 (ASTM B 209M).
  - 2. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
  - 3. Extruded Structural Pipe and Tubes: ASTM B 429.
- B. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning skylight components.
- D. Anchors, Fasteners, and Accessories: Manufacturer's standard, corrosion-resistant, nonstaining, and nonbleeding; compatible with adjacent materials.

- E. Concealed Flashing: Manufacturer's standard, corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.
- F. Framing Gaskets: Manufacturer's standard.
- G. Framing Sealants: As recommended in writing by manufacturer.
  - 1. Provide sealants for use inside of the weatherproofing system that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## 2.3 GLAZING SYSTEMS

- A. Glazing: Insulating-Glass Units, General: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class CBA units and with requirements specified in this Article and in Part 2 "Insulating-Glass Units" Article.
  - 1. Provide Kind FT (fully tempered) glass lites where safety glass is indicated.
  - 2. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated for insulating-glass units are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
  - 3. Sealing System: Dual seal, with primary and secondary sealants as follows:
    - a. Manufacturer's standard sealants.
- B. Solar-Control Low-E Insulating-Glass Units:
  - 1. Overall Unit Thickness and Thickness of Each Lite: 25 and 6.0 mm.
  - 2. Interspace Content: Air.
  - 3. Outdoor Lite: Class 1 (clear)float glass. Kind FT (fully tempered).
  - 4. Indoor Lite: Class 1 (clear)float glass. Kind FT (fully tempered).
  - 5. Color: Match in appearance the clear insulating-glass units of the factory glazed operable aluminum window units, Section 08520 – Aluminum Windows.
- C. Spacers, Setting Blocks, and Gaskets: Manufacturer's standard elastomeric types.
- D. Bond-Breaker Tape: Manufacturer's standard tetrafluoroethylene-fluorocarbon or polyethylene material to which sealants will not develop adhesion.
- E. Glazing Sealants: As recommended in writing by manufacturer.
  - 1. Provide sealants for use inside of the weatherproofing system that have a VOC content as indicated when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## 2.4 ACCESSORY MATERIALS

- A. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

## 2.5 FABRICATION

- A. Fabricate aluminum components before finishing.
- B. Fabricate aluminum components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.

2. Accurately fitted joints with ends coped or mitered.
  3. Internal guttering systems or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within skylight to exterior.
  4. Physical and thermal isolation of glazing from framing members.
  5. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
- C. Fabricate aluminum sill closures with weep holes and for installation as continuous component.
- D. Reinforce aluminum components as required to receive fastener threads.
- E. Weld aluminum components in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- F. Factory install glazing.
- G. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.6 ALUMINUM FINISHES

- A. Aluminum Anodic Finish: Class I, clear anodic coating complying with AAMA 611.

## 2.7 SOURCE QUALITY CONTROL

- A. Structural-Sealant Glazing: Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, material qualification procedures, sealant testing, and fabrication reviews and checks.

# PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. General:
1. Do not install damaged components.
  2. Fit joints between aluminum components to produce hairline joints free of burrs and distortion.
  3. Rigidly secure nonmovement joints.
  4. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
  5. Weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
  6. Seal joints watertight, unless otherwise indicated.
- B. Metal Protection: Where aluminum will contact dissimilar materials, protect against galvanic action by painting contact surfaces with bituminous paint or by installing nonconductive spacers as recommended in writing by manufacturer for this purpose.
- C. Install continuous aluminum sill closure with weatherproof expansion joints and locked and sealed or welded corners. Locate weep holes at rafters.

- D. Install components to drain water passing joints, condensation occurring within framing members, and moisture migrating within skylight to exterior.
- E. Install components plumb and true in alignment with established lines and elevations.
- F. Install glazing as specified in Division 8 Section "Glazing."
- G. Erection Tolerances: Install metal-framed skylights to comply with the following maximum tolerances:
  - 1. Alignment: Limit offset from true alignment to 1/32 inch (0.8 mm) where surfaces abut in line, edge to edge, at corners, or where a reveal or protruding element separates aligned surfaces by less than 3 inches (76 mm); otherwise, limit offset to 1/8 inch (3.2 mm).
  - 2. Location and Plane: Limit variation from true location and plane to 1/8 inch in 12 feet (3.2 mm in 3.7 m) but no greater than 1/2 inch (13 mm) over total length.

### 3.2 FIELD QUALITY CONTROL

- A. Water-Spray Test: Before installation of interior finishes has begun, assemblies shall be tested according to AAMA 501.2 and shall not evidence water penetration.
  - 1. Repair or remove work where test results and inspections indicate that it does not comply with specified requirements.
  - 2. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.

END OF SECTION 08 63 00

SECTION 08 70 00  
DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes:

1. Mechanical and Electromechanical door hardware for the following:
  - a. Swinging doors.

1.2 ACTION SUBMITTALS

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

B. Samples: For each exposed product and for each color and texture specified. Samples will be returned after review and, if approved, may be incorporated into the Work.

C. Other Action Submittals:

1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
  - a. Format: Use same door numbers as in the Contract Documents.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.

B. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.

C. Accessibility Requirements: For door hardware on doors in an accessible route, comply with the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
2. Comply with the following maximum opening-force requirements:
  - a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
4. Adjust door closer sweep periods so that, from an open position of 70 degrees, the door will take at least 3 seconds to move to a point 3 inches (75 mm) from the latch, measured to the leading edge of the door.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Locksets: Ten years from date of Substantial Completion.
2. Closers: Thirty years from date of Substantial Completion.
3. Panic Devices: Ten years from date of Substantial Completion.
4. Automatic Door Operators: Two years from date of Substantial Completion.
5. All other hardware: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 DOOR HARDWARE

#### A. Provide proper door hardware for each door.

1. Door Hardware Sets: Drawings contain a general description of the door hardware of each door. The hardware sets represent the design intent of the Owner and Architect. These sets are a guideline only and should not be considered a detailed hardware schedule. Discrepancies, conflicting hardware and missing items should be brought to the attention of the architect with corrections made prior to the submittal of the hardware schedule.
2. Provide quality, size, finish or color to match the existing hardware.
3. Furnish hardware items of proper design for use in doors and frames of the thicknesses, profile, security and similar requirements indicated, as necessary for proper installation and function. If this conflicts with information in the Contract Documents, notify the Architect prior to submission of hardware schedule.

### 2.2 MANUFACTURERS

#### A. The following manufacturers and hardware type are acceptable for bidding:

1. Hinges: Ives (IVE), Bommer, Stanley, McKinney.
2. Continuous Hinges: Ives (IVE), Select.
3. Locks and Cylinders: Schlage (SCH) - No Substitution.
4. Permanent Cores: Best (BES) – No Substitution.
5. Panic Exit Devices: Von Duprin (VON) – No Substitution.
6. Surface Mounted Closers: LCN - No Substitution.
7. Automatic Door Operators: LCN – No Substitution.
8. Pulls, Protection Plates and Stops: Ives (IVE), Trimco, Rockwood
9. Overhead Stops: Glynn Johnson (GLY – No Substitution.
10. Electromagnetic Wall Holders: LCN (LCN) – No Substitution.
11. Thresholds and Seals: National Guard (NGP), Reese, Zero.

### 2.3 KEYING

- #### A. Keying System: Grand Master key all permanent cores as directed by NAU Lock shop. Contact NAU Lock shop to verify the keyway to be used for this project. Distributor to set up keying meeting with owner and submit meeting notes and keying schedule for approval before ordering permanent cores and permanent keys. All permanent cores to have Best small format 7 pin interchangeable cores (SFIC). All locksets and cylinders to have brass construction cores. Stamp all keys with visual key control number and "DO NOT DUPLICATE".

### 2.4 FABRICATION

- #### A. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized

industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.

## 2.5 FINISHES

- A. Provide finishes complying with BHMA A156.18 and that match existing hardware.
- B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## 2.6 PRE-INSTALLATION CONFERENCE AT PROJECT SITE

- A. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
- B. Inspect and discuss preparatory work performed by other trades.
- C. Inspect and discuss electrical roughing-in for electrified door hardware.
- D. Review sequence of operation for each type of electrified door hardware.
- E. Review required testing, inspecting, and certifying procedures.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Mounting Heights: Mount door hardware units at heights to comply with the following unless otherwise indicated or required to comply with governing regulations.
  - 1. Wood Doors: DHI WDHS.3, "Recommended Locations for Architectural Hardware for Wood Flush Doors."
- B. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
  - 1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
  - 2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.
- C. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.
- D. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.
- E. Pre-Installation Meeting and Post Installation Survey:

1. All installers and installation foreman are required to attend a mandatory installation training meeting in Payson (location to be determined) for a minimum of two (2) hours prior to installing any hardware at the job site. Training will consist of proper installation of locksets, panic exit devices and door closers. Training will be completed by an Ingersoll Rand Security Technologies representative. At the end of the training class all students will receive a certificate of completion that they must keep with them at all times when at the job site.
2. When all hardware has been completely installed, the Contractor, Installation Foreman and an Allegion representative will complete a walk-thru installation survey of all doors to verify that all hardware has been installed correctly.

### 3.2 HARDWARE SCHEDULE

HW SET: AL-01

EACH TO HAVE:

ALL HDWE. BY DR. MFG.

HW SET: AL-02

EACH TO HAVE:

2	EA	PERMANENT CORE	1CP7 (VERIFY KEYWAY)	626	BES
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THE FOLLOWING PROVIDED AND INSTALLED UNDER SECTION 08 41 13:

2	EA	CONT. HINGE	112HD EPT	628	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC DEVICE	RX-QEL+-9849-DT-990	626	VON
1	EA	ELEC PANIC DEVICE	RX-QEL+-SD-9849-NL-990	626	VON
2	EA	RIM CYLINDER	80-159	626	SCH
2	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA ST-2731TBWMS	689	LCN
1	EA	SURF. AUTO OPERATOR	4642 RH (LHR DR. LEAF) (SEE NOTE)	689	LCN
2	EA	WALL ACTUATOR	8310-3856WS (WIRELESS)	630	LCN
2	EA	RF RECEIVER	8310-865	BLU	LCN
2	EA	FLOOR STOP	FS18S	BLK	IVE
2	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	655A MSLA-10	AL	ZER
2	EA	DR. POS. SWITCH	1076CW	TAN	SEN
1	EA	POWER SUPPLY	PS914 900-BBK 900-4RL	LGR	VON
1	SET	WEATHERSTRIP	(WITH FRAME AND DOORS)		
1	EA	WIRING DIAGRAM	POINT TO POINT SYSTEM		VON
		CARD READER	(BY SECURITY CONTRACTOR)		

NOTE: INSTALL OVERHEAD STOPS FIRST THEN CLOSER AND AUTO. OPERATOR WITH TOP HEADER CEILING MOUNT TO CLEAR O.H. STOP. AUTO. OPERATOR ARM MUST BE THRU BOLTED TO DOOR.

HW SET: AL-02A

EACH TO HAVE:

3	EA	PERMANENT CORE	1CP7 (VERIFY KEYWAY)	626	BES
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THE FOLLOWING PROVIDED AND INSTALLED UNDER SECTION 08 41 13:

2	EA	CONT. HINGE	112HD EPT	628	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC DEVICE	RX-QEL+-9849-DT-990	626	VON
1	EA	ELEC PANIC DEVICE	RX-QEL+-SD-9849-NL-990	626	VON
1	EA	MORTISE CYLINDER	80-132 GRN	626	SCH
2	EA	RIM CYLINDER	80-159	626	SCH
2	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA ST-2731TBWMS	689	LCN
1	EA	SURF. AUTO OPERATOR	4642 LH (RHR DR. LEAF) (SEE NOTE)	689	LCN
2	EA	WALL ACTUATOR	8310-3856WS (WIRELESS)	630	LCN
2	EA	RF RECEIVER	8310-865	BLU	LCN
1	EA	MOUNTING PLATE	9540-18	689	LCN
2	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	655A MSLA-10	AL	ZER
1	EA	KEYSWITCH	653-04 NS L2	630	SCE
2	EA	DR. POS. SWITCH	1076CW	TAN	SEN
1	EA	POWER SUPPLY	PS914 900-BBK 900-4RL	LGR	VON
1	SET	WEATHERSTRIP	(WITH FRAME AND DOORS)		
1	EA	WIRING DIAGRAM	POINT TO POINT SYSTEM		VON

NOTE: INSTALL OVERHEAD STOPS FIRST THEN CLOSER AND AUTO. OPERATOR WITH TOP HEADER CEILING MOUNT TO CLEAR O.H. STOP. AUTO. OPERATOR ARM MUST BE THRU BOLTED TO DOOR.

HW SET: AL-03 (NOT USED)

HW SET: AL-03A

EACH TO HAVE:

3	EA	PERMANENT CORE	1CP7 (VERIFY KEYWAY)	626	BES
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THE FOLLOWING PROVIDED AND INSTALLED UNDER SECTION 08 41 13:

1	EA	CONT. HINGE	112HD	628	IVE
1	EA	ELEC. PANIC DEVICE	RX-QEL+-SD-98-NL-990	626	VON
1	EA	MORTISE CYLINDER	80-132 GRN	626	SCH
2	EA	RIM CYLINDER	80-159	626	SCH
1	EA	AUTO. OPERATOR	4642	ANCLR	LCN
2	EA	WALL ACTUATOR	8310-3853TWS	630	LCN
2	EA	RF RECEIVER	8310-865	BLU	LCN
1	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	8655A 36" MSLA-10	AL	ZER
1	EA	KEYSWITCH	653-04 NS L2	630	SCE
1	EA	POWER SUPPLY	PS914 900-BBK 900-4RL	LGR	VON
1	SET	WEATHERSTRIP	(WITH FRAME AND DOORS)		
1	EA	WIRING DIAGRAM	POINT TO POINT SYSTEM		VON

HW SET: GL-01

EACH TO HAVE:

3	EA	PERMANENT CORE	1CP7 (VERIFY KEYWAY)	626	BES
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THE FOLLOWING PROVIDED AND INSTALLED UNDER SECTION 08 41 13:

1	EA	PIVOT SET	7255 SET	626	IVE
1	EA	MAGNETIC LOCK	M452P	628	SCE
2	SET	DOOR PULLS	(2 EA.) DT1214 36" B3 B. TO B. MTG.	630	FOR
1	EA	CONCEALED CLOSER	2011 BUMP	689	LCN
1	EA	CONC. AUTO OPERATOR	2811 STD/CP DD POS MP	ANCLR	LCN
2	EA	WALL ACTUATOR	8310-3856WS (WIRELESS)	630	LCN
2	EA	RF RECEIVER	8310-865	BLU	LCN
2	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	PUSHBUTTON	623RD DA NS L2/ILL	629	SCE
1	EA	MOTION SENSOR	SCANII	WHT	SCE
1	EA	POWER SUPPLY	PS904 900-BBK 900-4R-FA	LGR	SCE
1	EA	WIRING DIAGRAM	POINT TO POINT SYSTEM		SCE
1	EA	KEYSWITCH	653-04 NS L2	630	SCE
1	EA	MORTISE CYLINDER	80-132 GRN	626	SCH

NOTE: VERIFY HEAD AND JAMB DETAILS.

NOTE: FLOOR STOPS TO BE INSTALLED CLOSE TO DOOR JAMBS TO PREVENT TRIPPING HAZARD.

NOTE: AUTOMATIC DOOR OPERATOR HAS BOTTOM PIVOT AND TOP ARM ASSEMBLY FOR ACTIVE DOOR LEAF. INACTIVE DOOR LEAF TO HAVE SEPARATE TOP AND BTM. PIVOTS.

HW SET: GL-02

EACH TO HAVE:

1	EA	PERMANENT CORE	1CP7 (VERIFY KEYWAY)	626	BES
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THE FOLLOWING PROVIDED AND INSTALLED UNDER SECTION 08 41 13:

1	EA	BTM PIVOT	INT403	630	CRL
1	EA	BTM DR. PATCH	PH10CBS	630	CRL
2	EA	TOP DR. PATCH	PH20ABS	630	CRL
1	EA	TRNS TOP PATCH	PH40BS (WITH DR. PIVOT INT300)	630	CRL
1	EA	TRNS TOP PATCH	PH40BS (WITH DR. STOP 1NT306)	630	CRL
1	EA	GLASS LOCK	DT36BS (CENTER MOUNT)	630	CRL
1	EA	LEVER TURN	09-900 X XB11-720	626	SCH
1	EA	MORTISE CYLINDER	80-132 GRN	626	SCH
1	EA	GLASS LOCK STRIKE	DTK36BS (CENTER MOUNT)	630	CRL
1	SET	DOOR PULLS	(2 EA.) DT1214 36" B3 B. TO B. MTG.	630	FOR
1	EA	FLOOR STOP	FS18S	BLK	IVE

NOTE: GLASS DOOR LOCK AND GLASS WALL STRIKE MOUNTED AT 40" ABOVE FINISH FLOOR LEVEL. SPECIAL CUT OUT IN DOOR AND GLASS WALL REQUIRED. ADJUST PULLS IN GLASS FOR CLEARANCE TO OPERATE KEY IN CYLINDER AND LEVER TURN INSIDE.

HW SET: GL-03

EACH TO HAVE:

THE FOLLOWING PROVIDED AND INSTALLED UNDER SECTION 08 41 13:

1	EA	BTM PIVOT	INT403	630	CRL
1	EA	BTM DR. PATCH	PH10CBS	630	CRL
2	EA	TOP DR. PATCH	PH20ABS	630	CRL
1	EA	TRNS TOP PATCH	PH40BS (WITH DR. PIVOT INT300)	630	CRL
1	EA	TRNS TOP PATCH	PH40BS (WITH DR. STOP 1NT306)	630	CRL
1	SET	DOOR PULLS	(2 EA.) DT1214 36" B3 B. TO B. MTG.	630	FOR
1	EA	FLOOR STOP	FS18S	BLK	IVE

NOTE: VERIFY HEAD AND JAMB DETAILS.

HW SET: 01

EACH TO HAVE:

2	EA	CONT. HINGE	HT224HD	628	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PRF. STRIKE	DP1	626	IVE
1	EA	PANIC DEVICE	LD-98-NL-990-1609	626	VON
1	EA	RIM CYLINDER	80-159	626	SCH
1	EA	PERMANENT CORE	1CP7 (VERIFY KEYWAY)	626	BES
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MTG. BRACKET	MB	689	IVE
2	EA	CLOSER/ STOP	4040XP SCUSH TBWMS	689	LCN
1	EA	RAIN DRIP	142A	AL	ZER
1	EA	HEAD SEAL	429A	AL	ZER
1	EA	ASTRGL. SEAL	188S (ONE EDGE _ BTWN. DRS.)	BLK	ZER
2	EA	JAMB SEAL	328AA (BOTH JAMBS)	628	ZER
1	EA	ASTRAGAL	43STST	630	ZER
2	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	656A MSLA-10	AL	ZER
2	EA	DR. POS. SWITCH	1076CW	TAN	SEN

NOTE: INSTALL HEAD SEAL FIRST BEFORE CLOSERS.

HW SET: 01A

EACH TO HAVE:

2	EA	CONT. HINGE	HT224HD	628	IVE
1	SET	AUTO FLUSH BOLT	FB31P	630	IVE
1	EA	DUST PRF. STRIKE	DP1	626	IVE
1	EA	PANIC DEVICE	98-NL-F-990	626	VON
1	EA	RIM CYLINDER	80-159	626	SCH
1	EA	PERMANENT CORE	1CP7 (VERIFY KEYWAY)	626	BES
1	EA	COORDINATOR	COR X FL	628	IVE
2	EA	MTG. BRACKET	MB	689	IVE
2	EA	CLOSER/ STOP	4040XP SCUSH TBWMS	689	LCN
1	EA	RAIN DRIP	142A	AL	ZER
1	EA	HEAD SEAL	429A	AL	ZER
1	EA	ASTRGL. SEAL	188S (ONE EDGE _ BTWN. DRS.)	BLK	ZER
2	EA	JAMB SEAL	328AA (BOTH JAMBS)	628	ZER
1	EA	ASTRAGAL	43STST	630	ZER
2	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	656A MSLA-10	AL	ZER
2	EA	DR. POS. SWITCH	1076CW	TAN	SEN

NOTE: INSTALL HEAD SEAL FIRST BEFORE CLOSERS.

3.6 HARDWARE SETS

HW SET: AL-01

EACH TO HAVE:

ALL HDWE. BY DR. MFG.

HW SET: AL-02

EACH TO HAVE:

2	EA	CONT. HINGE	112HD EPT	628	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC DEVICE	RX-QEL+-9849-DT-990	626	VON
1	EA	ELEC PANIC DEVICE	RX-QEL+-SD-9849-NL-990	626	VON
2	EA	RIM CYLINDER	80-159	626	SCH
2	EA	PERMANENT CORE	1CP7 (BY SECTION 08 70 00)	626	BES
2	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA ST-2731TBWMS	689	LCN
1	EA	SURF. AUTO OPERATOR	4642 RH (LHR DR. LEAF) (SEE NOTE)	689	LCN
2	EA	WALL ACTUATOR	8310-3856WS (WIRELESS)	630	LCN
2	EA	RF RECEIVER	8310-865	BLU	LCN
2	EA	FLOOR STOP	FS18S	BLK	IVE
2	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	655A MSLA-10	AL	ZER
2	EA	DR. POS. SWITCH	1076CW	TAN	SEN
1	EA	POWER SUPPLY	PS914 900-BBK 900-4RL	LGR	VON
1	SET	WEATHERSTRIP	(WITH FRAME AND DOORS)		
1	EA	WIRING DIAGRAM	POINT TO POINT SYSTEM		VON
		CARD READER	(BY SECURITY CONTRACTOR)		

NOTE: INSTALL OVERHEAD STOPS FIRST THEN CLOSER AND AUTO. OPERATOR WITH TOP HEADER CEILING MOUNT TO CLEAR O.H. STOP. AUTO. OPERATOR ARM MUST BE THRU BOLTED TO DOOR.

HW SET: AL-02A

EACH TO HAVE:

2	EA	CONT. HINGE	112HD EPT	628	IVE
2	EA	POWER TRANSFER	EPT10	689	VON
1	EA	ELEC PANIC DEVICE	RX-QEL+-9849-DT-990	626	VON
1	EA	ELEC PANIC DEVICE	RX-QEL+-SD-9849-NL-990	626	VON
1	EA	MORTISE CYLINDER	80-132 GRN	626	SCH
2	EA	RIM CYLINDER	80-159	626	SCH
3	EA	PERMANENT CORE	1CP7 (BY SECTION 08 70 00)	626	BES
2	EA	OH STOP	90S	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA ST-2731TBWMS	689	LCN
1	EA	SURF. AUTO OPERATOR	4642 LH (RHR DR. LEAF) (SEE NOTE)	689	LCN
2	EA	WALL ACTUATOR	8310-3856WS (WIRELESS)	630	LCN
2	EA	RF RECEIVER	8310-865	BLU	LCN
1	EA	MOUNTING PLATE	9540-18	689	LCN
2	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	655A MSLA-10	AL	ZER
1	EA	KEYSWITCH	653-04 NS L2	630	SCE
2	EA	DR. POS. SWITCH	1076CW	TAN	SEN
1	EA	POWER SUPPLY	PS914 900-BBK 900-4RL	LGR	VON
1	SET	WEATHERSTRIP	(WITH FRAME AND DOORS)		
1	EA	WIRING DIAGRAM	POINT TO POINT SYSTEM		VON

NOTE: INSTALL OVERHEAD STOPS FIRST THEN CLOSER AND AUTO. OPERATOR WITH TOP HEADER CEILING MOUNT TO CLEAR O.H. STOP. AUTO. OPERATOR ARM MUST BE THRU BOLTED TO DOOR.

HW SET: AL-03 (NOT USED)

HW SET: AL-03A

EACH TO HAVE:

1	EA	CONT. HINGE	112HD	628	IVE
1	EA	ELEC. PANIC DEVICE	RX-QEL+-SD-98-NL-990	626	VON
1	EA	MORTISE CYLINDER	80-132 GRN	626	SCH
2	EA	RIM CYLINDER	80-159	626	SCH
3	EA	PERMANENT CORE	1CP7 (BY SECTION 08 70 00)	626	BES
1	EA	AUTO. OPERATOR	9542 MS	ANCLR	LCN
2	EA	WALL ACTUATOR	8310-3853TWS	630	LCN
1	EA	ROCKER SWITCH	8310-806R	689	LCN
2	EA	RF RECEIVER	8310-865	BLU	LCN
1	EA	MOUNTING PLATE	9540-18	689	LCN
1	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	8655A 36" MSLA-10	AL	ZER
1	EA	KEYSWITCH	653-04 NS L2	630	SCE
1	EA	POWER SUPPLY	PS914 900-BBK 900-4RL	LGR	VON
1	SET	WEATHERSTRIP	(WITH FRAME AND DOORS)		
1	EA	WIRING DIAGRAM	POINT TO POINT SYSTEM		VON

HW SET: GL-01

EACH TO HAVE:

1	EA	PIVOT SET	7255 SET	626	IVE
1	EA	MAGNETIC LOCK	M452P	628	SCE
2	SET	DOOR PULLS	(2 EA.) DT1214 36" B3 B. TO B. MTG.	630	FOR
1	EA	CONCEALED CLOSER	2011 BUMP	689	LCN
1	EA	CONC. AUTO OPERATOR	2811 STD/CP DD POS MP	ANCLR	LCN
2	EA	WALL ACTUATOR	8310-3856WS (WIRELESS)	630	LCN
2	EA	RF RECEIVER	8310-865	BLU	LCN
2	EA	FLOOR STOP	FS18S	BLK	IVE
1	EA	PUSHBUTTON	623RD DA NS L2/ILL	629	SCE
1	EA	MOTION SENSOR	SCANII	WHT	SCE
1	EA	POWER SUPPLY	PS904 900-BBK 900-4R-FA	LGR	SCE
1	EA	WIRING DIAGRAM	POINT TO POINT SYSTEM		SCE

NOTE: VERIFY HEAD AND JAMB DETAILS.

NOTE: FLOOR STOPS TO BE INSTALLED CLOSE TO DOOR JAMBS TO PREVENT TRIPPING HAZARD.

NOTE: AUTOMATIC DOOR OPERATOR HAS BOTTOM PIVOT AND TOP ARM ASSEMBLY FOR ACTIVE DOOR LEAF. INACTIVE DOOR LEAF TO HAVE SEPARATE TOP AND BTM. PIVOTS.

HW SET: GL-02

EACH TO HAVE:

1	EA	BTM PIVOT	INT403	630	CRL
1	EA	BTM DR. PATCH	PH10CBS	630	CRL
2	EA	TOP DR. PATCH	PH20ABS	630	CRL
1	EA	TRNS TOP PATCH	PH40BS (WITH DR. PIVOT INT300)	630	CRL
1	EA	TRNS TOP PATCH	PH40BS (WITH DR. STOP 1NT306)	630	CRL
1	EA	GLASS LOCK	DT36BS (CENTER MOUNT)	630	CRL
1	EA	LEVER TURN	09-900 X XB11-720	626	SCH
1	EA	MORTISE CYLINDER	80-132 GRN	626	SCH
1	EA	PERMANENT CORE	1CP7 (BY SECTION 08 70 00)	626	BES
1	EA	GLASS LOCK STRIKE	DTK36BS (CENTER MOUNT)	630	CRL
1	SET	DOOR PULLS	(2 EA.) DT1214 36" B3 B. TO B. MTG.	630	FOR
1	EA	FLOOR STOP	FS18S	BLK	IVE

NOTE: GLASS DOOR LOCK AND GLASS WALL STRIKE MOUNTED AT 40" ABOVE FINISH FLOOR LEVEL. SPECIAL CUT OUT IN DOOR AND GLASS WALL REQUIRED. ADJUST PULLS IN GLASS FOR CLEARANCE TO OPERATE KEY IN CYLINDER AND LEVER TURN INSIDE.

HW SET: GL-03

EACH TO HAVE:

1	EA	BTM PIVOT	INT403	630	CRL
1	EA	BTM DR. PATCH	PH10CBS	630	CRL
2	EA	TOP DR. PATCH	PH20ABS	630	CRL
1	EA	TRNS TOP PATCH	PH40BS (WITH DR. PIVOT INT300)	630	CRL
1	EA	TRNS TOP PATCH	PH40BS (WITH DR. STOP 1NT306)	630	CRL
1	SET	DOOR PULLS	(2 EA.) DT1214 36" B3 B. TO B. MTG.	630	FOR
1	EA	FLOOR STOP	FS18S	BLK	IVE

NOTE: VERIFY HEAD AND JAMB DETAILS.

END OF SECTION 08 41 13

## SECTION 08 80 00

### GLAZING

#### 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 glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
  - 1. Doors.
  - 2. Storefront framing.
  - 3. Glazed entrances.
  - 4. Fire-rated glazing.
  - 5. Interior borrowed lites.

##### 1.3 DEFINITIONS

- A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.
- B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.
- C. Interspace: Space between lites of an insulating-glass unit.

##### 1.4 PERFORMANCE REQUIREMENTS

- A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Delegated Design: Design glass, including comprehensive engineering analysis according to ICC's 2003 International Building Code by a qualified professional engineer, using the following design criteria:
  - 1. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
    - a. Wind Design Data: As indicated on Structural General Notes on Drawings.
  - 2. Design Snow Loads: As indicated on Drawings.
  - 3. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
  - 4. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch (25 mm), whichever is less.

5. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
    1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

#### 1.5 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. LEED Submittals:
  1. Product Data for Credit IEQ 4.1: For field-applied glazing sealants, documentation including printed statement of VOC content.
- C. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.
  1. Tinted glass.
  2. Coated glass.
  3. Laminated glass with colored interlayer.
  4. Fire-rated insulated glass (tinted).
  5. Insulating glass.
  6. Spandrel glass.
- D. Glazing Accessory Samples: For gaskets and colored spacers, in 12-inch (300-mm) lengths.
- E. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.
- F. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- G. Warranties: Sample of special warranties.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications for Insulating-Glass Units with Sputter-Coated, Low-E Coatings: A qualified insulating-glass manufacturer who is approved by coated-glass manufacturer.
- B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.
- C. Source Limitations for Glass: Obtain insulating glass from single source from single manufacturer for each glass type.
- D. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.
- E. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA's "Glazing Manual."
2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

F. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

G. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

H. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Install glazing in mockups specified in Division 08 Section "Aluminum-Framed Entrances and Storefronts and Glazed Aluminum Curtain Walls" to match glazing systems required for Project, including glazing methods.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

#### 1.8 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.

1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F (4.4 deg C).

#### 1.9 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's

written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 GLASS PRODUCTS, GENERAL

- A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
  1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.
  2. Thickness of Tinted Glass: Provide same thickness for each tint color indicated throughout Project.
- B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.
- C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
  1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick.
  2. For laminated-glass lites, properties are based on products of construction indicated.
  3. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
  4. U-Factors: Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).
  5. Solar Heat-Gain Coefficient and Visible Transmittance: Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.
  6. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

### 2.2 GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
  1. Tinted Float Glass: Class 2, complying with other requirements specified.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
  1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
  2. For uncoated glass, comply with requirements for Condition A.
  3. For coated vision glass, comply with requirements for Condition C (other coated glass).
- C. Insulating-Glass Units: Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190, and complying with other requirements specified.

## 2.3 MONOLITHIC-GLASS TYPES

- A. Glass Type: Clear fully tempered float glass.
1. Thickness: As indicated.
  2. Provide safety glazing labeling.

## 2.4 INSULATING-GLASS TYPES

- A. Glass Type (Clear): Low-e-coated, reflective, tinted insulating glass. PPG "Solarban 70 XL" (2) on clear + ½" Air + 6mm clear.
1. Overall Unit Thickness: 1 inch (25 mm).
  2. Thickness of Each Glass Lite: 6.0 mm.
  3. Outdoor Lite: Clear heat-strengthened float glass.
  4. Interspace Content: Manufacturer's standard desiccant.
  5. Indoor Lite: Clear fully tempered or heat-strengthened float glass.
  6. Low-E Coating: Pyrolytic or sputtered on second surface as recommended by the manufacturer.
  7. Visible Light Transmittance: 64 percent minimum.
  8. Winter Nighttime U-Factor: 0.28 maximum.
  9. Summer Daytime U-Factor: 0.26 maximum.
  10. Solar Heat Gain Coefficient: 0.27 maximum.
  11. Provide safety glazing labeling.
- B. Glass Type (Tinted): Low-e-coated, reflective, tinted insulating glass. PPG "Solarban 70 XL" (2) on "Solargray" + ½" Air + 6mm "Sungate 600" (4) on clear.
1. Overall Unit Thickness: 1 inch (25 mm).
  2. Thickness of Each Glass Lite: 6.0 mm.
  3. Outdoor Lite: Tinted heat-strengthened float glass.
  4. Interspace Content: Manufacturer's standard desiccant.
  5. Indoor Lite: Clear fully tempered or heat-strengthened float glass.
  6. Low-E Coating: Pyrolytic or sputtered on second surface as recommended by the manufacturer.
  7. Visible Light Transmittance: 30 percent minimum.
  8. Winter Nighttime U-Factor: 0.23 maximum.
  9. Summer Daytime U-Factor: 0.20 maximum.
  10. Solar Heat Gain Coefficient: 0.18 maximum.
  11. Provide safety glazing labeling.
  12. Tint Color: Light gray to match Architects sample.

## 2.5 FIRE-PROTECTION-RATED GLAZING

- A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies.
- B. Laminated Ceramic Glazing: Laminated glass made from 2 plies of clear, ceramic flat glass; 5/16-inch(8-mm) total nominal thickness; complying with testing requirements in 16 CFR 1201 for Category II materials.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Nippon Electric Glass Co., Ltd. (distributed by Technical Glass Products); FireLite Plus.
    - b. Schott North America, Inc.; Laminated Pyran Crystal.
    - c. Vetrotech Saint-Gobain; SGG Keralite FR-L.

## 2.6 GLAZING GASKETS

- A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
1. Neoprene complying with ASTM C 864.
  2. EPDM complying with ASTM C 864.
  3. Silicone complying with ASTM C 1115.
  4. Thermoplastic polyolefin rubber complying with ASTM C 1115.
- B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned neoprene, EPDM, silicone, or thermoplastic polyolefin rubber gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

## 2.7 GLAZING SEALANTS

- A. General:
1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
  2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
  3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
  4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.
- B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. BASF Building Systems; Omniseal 50.
    - b. Dow Corning Corporation; 795.
    - c. GE Advanced Materials - Silicones; SilGlaze II SCS2800.
    - d. Polymeric Systems, Inc.; PSI-641.
    - e. Sika Corporation, Construction Products Division; SikaSil-C995.
    - f. Tremco Incorporated; Spectrem 2.

## 2.8 GLAZING TAPES

- A. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.
  2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

- B. Glass panels that exceed 1393 sq. inches for 90 minute ratings shall be glazed with fire-rated glazing tape as supplied by the fire-rated glass manufacturer.

## 2.9 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

## 2.10 FABRICATION OF GLAZING UNITS

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
  - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
  - 2. Presence and functioning of weep systems.
  - 3. Minimum required face and edge clearances.
  - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.
- B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

### 3.3 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).
  - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
  - 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.
- K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.
- L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

### 3.4 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until right before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant where indicate.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

### 3.5 GASKET GLAZING (DRY)

- A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- E. Install gaskets so they protrude past face of glazing stops.

### 3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.

- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

### 3.7 CLEANING AND PROTECTION

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 08 80 00

SECTION 08 81 16

DECORATIVE FILM FOR GLASS

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 glass with decorative film overlay.

1.3 ACTION SUBMITTALS

- A. Product Data: For each decorative film product indicated.
- B. Glass Samples: For the following products, 12 inches (300 mm) square:
  - 1. Each type of decorative film.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of decorative film overlay to include in maintenance manuals.

1.6 QUALITY ASSURANCE

- A. Glazing Publications: Comply with published recommendations in GANA's "Glazing Manual" unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.
- B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for fabrication and installation.
  - 1. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Protect decorative film according to manufacturer's written instructions and as needed to prevent damage to surfaces.

## 1.8 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install decorative film until wet work in spaces is complete and dry, and HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.
- B. Field Measurements: Verify actual dimensions of openings and construction contiguous with decorative film by field measurements before fabrication.

## PART 2 - PRODUCTS

### 2.1 DECORATIVE FILM

- A. Decorative Film (Translucent): Glass with translucent decorative film overlay. Use translucent, dimensionally stable, cast PVC film, 2-mil- (0.05-mm-) minimum thickness, with pressure-sensitive, clear adhesive back for adhering to glass and releasable protective backing.
  - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Avery Dennison, Graphics; Etchmark A5861-S.
    - b. FDC Graphic Films, Inc.; Intermediate Frosted Crystal Vinyl Film Series 3804, Silver.
    - c. FDC Graphic Films, Inc.; Premium Frosted Etched Glass Vinyl Film Series 3500.
    - d. 3M; Scotchcal Dusted Crystal.
    - e. 3M; Scotchcal Frosted Crystal, Clear.
  - 2. Comply with requirements for safety glazing.
  - 3. Use: Suitable for exterior and interior applications.
  - 4. Patterns: As selected by Architect from manufacturer's full range.
  - 5. Owner will provide custom graphic that shall be cut into film by Contractor.
- B. Decorative Film (Opaque): Glass with opaque decorative film overlay. Use opaque, dimensionally stable, cast PVC film, 2-mil- (0.05-mm-) minimum thickness, with pressure-sensitive, clear adhesive back for adhering to glass and releasable protective backing.
  - 1. Comply with requirements for safety glazing.
  - 2. Use: Suitable for exterior and interior applications.
  - 3. Color/Pattern: As indicated.

### 2.2 DECORATIVE FILM FABRICATION

- A. Decorative Film Overlay: Apply squarely aligned to glass edges, uniformly smooth, and free from tears, air bubbles, wrinkles, and rough edges, in single sheet completely overlaying the back face of clean glass, according to manufacturer's written instructions, including surface preparation and application temperature limitations.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine glass to receive decorative film, with Installer present.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. Clean glazing members receiving film immediately before application.

3.3 INSTALLATION

- A. Comply with combined written instructions of manufacturer of film.

3.4 CLEANING AND PROTECTION

- A. Protect decorative film from damage immediately after installation. Do not apply markers to film surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect film from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with film, remove substances immediately as recommended in writing by film manufacturer.
- C. Wash glass with film on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by film manufacturer.

END OF SECTION 08 81 16

SECTION 08 83 00

MIRRORS

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 the following types of silvered flat glass mirrors:
  - 1. Laminated glass mirrors qualifying as safety glazing.
- B. Related Sections:
  - 1. Section 08 80 00 "Glazing" for glass with reflective coatings used for vision and spandrel lites.
  - 2. Section 10 28 00 "Toilet and Bath Accessories" for metal-framed mirrors.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
  - 1. Mirrors. Include description of materials and process used to produce each type of silvered flat glass mirror specified that indicates sources of glass, glass coating components, edge sealer, and quality-control provisions.
- B. LEED Submittals:
  - 1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
- C. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachments to other work.
- D. Samples: For each type of the following products:
  - 1. Mirrors: Three samples, 12 inches (300 mm) square including edge treatment on two adjoining edges.
  - 2. Mirror Clips: Three samples, full size.
- E. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For mirrors to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

- B. Source Limitations for Mirrors: Obtain mirrors from single source from single manufacturer.
- C. Glazing Publications: Comply with the following published recommendations:
  - 1. GANA's "Glazing Manual" unless more stringent requirements are indicated. Refer to this publication for definitions of glass and glazing terms not otherwise defined in this Section or in referenced standards.
  - 2. GANA Mirror Division's "Mirrors, Handle with Extreme Care: Tips for the Professional on the Care and Handling of Mirrors."
- D. Safety Glazing Products: For laminated mirrors, provide products complying with testing requirements in 16 CFR 1201 for Category II materials.
- E. Preconstruction Mirror Mastic Compatibility Test: Submit mirror mastic products to mirror manufacturer for testing to determine compatibility of mastic with mirror backing and substrates on which mirrors are installed.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect mirrors according to mirror manufacturer's written instructions and as needed to prevent damage to mirrors from moisture, condensation, temperature changes, direct exposure to sun, or other causes.
- B. Comply with mirror manufacturer's written instructions for shipping, storing, and handling mirrors as needed to prevent deterioration of silvering, damage to edges, and abrasion of glass surfaces and applied coatings. Store indoors.

#### 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install mirrors until ambient temperature and humidity conditions are maintained at levels indicated for final occupancy.

#### 1.8 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which mirror manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.
  - 1. Warranty Period: Five years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 SILVERED FLAT GLASS MIRRORS

- A. Laminated Mirrors: ASTM C 1172, Kind LM.
  - 1. Clear Glass for Outer Lite: Mirror Select Quality; ultraclear (low-iron) float glass with a minimum 91 percent visible light transmission.
  - 2. Nominal Thickness for Outer Lite: 3.0 mm.
  - 3. Glass for Inner Lite: Annealed float glass; ASTM C 1036, Type I (transparent flat glass), Quality-Q3; Class 1 (clear).
  - 4. Nominal Thickness of Inner Lite: 3.0 mm.

5. Interlayer: Mirror manufacturer's standard 0.030-inch- (0.76-mm-) thick, clear polyvinyl-butylal interlayer with a proven record of showing no tendency to delaminate from, or cause damage to, silver coating.

## 2.2 MISCELLANEOUS MATERIALS

- A. Edge Sealer: Coating compatible with glass coating and approved by mirror manufacturer for use in protecting against silver deterioration at mirrored glass edges.
- B. Mirror Mastic: An adhesive setting compound, asbestos-free, produced specifically for setting mirrors and certified by both mirror manufacturer and mastic manufacturer as compatible with glass coating and substrates on which mirrors will be installed.

## 2.3 MIRROR HARDWARE

- A. Plated Steel Hardware: Formed-steel shapes with plated finish to match sink facet finish.
- B. Fasteners: Fabricated of same basic metal and alloy as fastened metal and matching it in finished color and texture where fasteners are exposed.
- C. Anchors and Inserts: Provide devices as required for mirror hardware installation. Provide toothed or lead-shield expansion-bolt devices for drilled-in-place anchors. Provide galvanized anchors and inserts for applications on inside face of exterior walls and where indicated.

## 2.4 FABRICATION

- A. Mirror Sizes: To suit Project conditions, and before tempering, cut mirrors to final sizes and shapes.
- B. Cutouts: Fabricate cutouts (if any) before tempering for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.
- C. Mirror Edge Treatment: Flat polished.
  1. Seal edges of mirrors with edge sealer after edge treatment to prevent chemical or atmospheric penetration of glass coating.
  2. Require mirror manufacturer to perform edge treatment and sealing in factory immediately after cutting to final sizes.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.
- B. Verify compatibility with and suitability of substrates, including compatibility of mirror mastic with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.

### 3.2 PREPARATION

- A. Comply with mastic manufacturer's written installation instructions for preparation of substrates, including coating substrates with mastic manufacturer's special bond coating where applicable.

### 3.3 INSTALLATION

- A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.
- B. Provide a minimum air space of 1/8 inch (3 mm) between back of mirrors and mounting surface for air circulation between back of mirrors and face of mounting surface.
- C. Wall-Mounted Mirrors: Install mirrors with mastic and mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.
  - 1. Mirror Clips: Place a felt or plastic pad between mirror and each clip to prevent spalling of mirror edges. Locate clips so they are symmetrically placed and evenly spaced.
  - 2. Install mastic as follows:
    - a. Apply barrier coat to mirror backing where approved in writing by manufacturers of mirrors and backing material.
    - b. After mastic is applied, align mirrors and press into place while maintaining a minimum air space of 1/8 inch (3 mm) between back of mirrors and mounting surface.

### 3.4 CLEANING AND PROTECTION

- A. Protect mirrors from breakage and contaminating substances resulting from construction operations.
- B. Do not permit edges of mirrors to be exposed to standing water.
- C. Maintain environmental conditions that will prevent mirrors from being exposed to moisture from condensation or other sources for continuous periods of time.
- D. Wash exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 08 83 00

SECTION 08 91 19

FIXED LOUVERS (Revised 3/20/15)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fixed, extruded aluminum louvers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
- C. Samples: For each type of metal finish required.

1.3 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on tests performed according to AMCA 500-L.
- B. Windborne-debris-impact-resistance test reports.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
  - 1. Wind Loads: Determine loads based on pressures as indicated on Drawings (Structural General Notes).
- B. *Provide AMCA Air Performance, Water Penetration, and Wind Driven Rain Certifications.*

2.2 FIXED, EXTRUDED-ALUMINUM LOUVERS

- A. Horizontal, Drainable, Sightproof Louver:
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Airolite K605 or comparable product approved by the Architect.
  - 2. Construction: Welded.
  - 3. Louver Depth: 5 inches.

4. Frame Type: Channel flange.
  5. Frame Thickness: 0.081 inch.
  6. Louver Blade Thickness: 0.081 inch.
  7. Louver Blade Profile: As indicated.
  8. Louver Blade Spacing: 2 inches o. c.
- B. Performance Requirements: As follows, determined by testing units 48 inches wide by 48 inches high per AMCA Standard 500:
1. Louver Free Area: Not less than 50 percent.
  2. Static Pressure Loss: Not more than 0.15 inch water gage at an airflow of 750 fpm free area intake velocity.
  3. Water Penetration: Not more than 0.02 oz. per sq. ft. of free area at an airflow of 760 fpm free area velocity when tested for 15 minutes.
  4. *Minimum free area for the Outside Air Louvers: 74.74 s.f.*
  5. *Minimum free area for the Relief Air Louver: 55.26 s.f.*
- C. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

### 2.3 LOUVER SCREENS

- A. General: Provide screen at each exterior louver.
1. Screen Location for Fixed Louvers: Interior face.
  2. Screening Type: Bird screening.
- B. Louver Screen Frames: Same type and form of metal as indicated for louver to which screens are attached.

### 2.4 BLANK-OFF PANELS

- A. General: Fabricate blank-off panels from materials and to sizes indicated and to comply with the following requirements:
1. Finish: Match finish applied to louver with respect to coating type, except for color which shall be black.
  2. Attach blank-off panels to back of louver frames with stainless steel sheet metal screws.
  3. Noninsulated Blank-Off Panels: Aluminum sheet for aluminum louvers, 0.051 inch, unless otherwise indicated.

### 2.5 MATERIALS

- A. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T5, T-52, or T6.
- B. Aluminum Sheet: ASTM B 209 (ASTM B 209M), Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.
- C. Fasteners: Use types and sizes to suit unit installation conditions.
1. Use Phillips flat-head screws for exposed fasteners unless otherwise indicated.
  2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
- D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.6 FABRICATION

- A. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
- B. Join frame members to each other and to fixed louver blades with fillet welds unless otherwise indicated.

## 2.7 ALUMINUM FINISHES

- A. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
  - 1. Color: Dark Bronze anodized to match storefront.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- D. Protect nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.

### 3.2 ADJUSTING

- A. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

END OF SECTION 08 91 19

GYPSUM BOARD SHAFT WALL ASSEMBLIES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Gypsum board shaft wall assemblies.

1.2 ACTION SUBMITTALS

- A. Product Data: For each component of gypsum board shaft wall assembly.

B. LEED Submittals:

1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
3. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regionally manufactured and regionally extracted and manufactured materials. Include statement indicating cost for each regionally manufactured material.
  - a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
  - b. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.
4. Product Data for Credit IEQ 4.1: For adhesives used to laminate gypsum board panels to substrates, documentation including printed statement of VOC content.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. STC-Rated Assemblies: Provide materials and construction identical to those of assemblies tested according to ASTM E 90 and classified according to ASTM E 413 by a testing and inspecting agency.

## 2.2 GYPSUM BOARD SHAFT WALL ASSEMBLIES

- A. Fire-Resistance Rating: As indicated.
- B. STC Rating: As indicated.
- C. Studs: Manufacturer's standard profile for repetitive members, corner and end members, and fire-resistance-rated assembly indicated.
  - 1. Depth: As indicated.
  - 2. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).
- D. Runner Tracks: Manufacturer's standard J-profile track with manufacturer's standard long-leg length, but at least 2 inches (51 mm) long and matching studs in depth.
  - 1. Minimum Base-Metal Thickness: 0.033 inch (0.84 mm).
- E. Firestop Tracks: Provide firestop track at head of shaft wall on each floor level.
- F. Room-Side Finish: Gypsum board.
- G. Shaft-Side Finish: As indicated by fire-resistance-rated assembly design designation.
- H. Insulation: Sound attenuation blankets.

## 2.3 PANEL PRODUCTS

- A. Panel Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.
- B. Gypsum Liner Panels: Proprietary liner panels as required for the specific fire-resistant-rated gypsum board shaft-wall assemblies indicated, with moisture-resistant paper facings.
- C. Gypsum Board: As specified in Section 09 29 00 "Gypsum Board."

## 2.4 AUXILIARY MATERIALS

- A. Trim Accessories: Material and shapes as specified in Section 09 29 00 "Gypsum Board" that comply with gypsum board shaft wall assembly manufacturer's written recommendations for application indicated.
- B. Steel Drill Screws: ASTM C 1002 unless otherwise indicated.
- C. Track Fasteners: Power-driven fasteners of size and material required to withstand loading conditions.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Comply with requirements of fire-resistance-rated assemblies indicated, manufacturer's written installation instructions, and ASTM C 754 other than stud-spacing requirements.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

- C. Sprayed Fire-Resistive Materials: Patch or replace sprayed fire-resistive materials removed or damaged during installation of shaft wall assemblies. After application, remove only to extent necessary for installation of gypsum board shaft wall assemblies.
- D. Install supplementary framing around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, handrails, and similar items.
- E. Penetrations: Install supplementary steel framing around perimeter of penetration behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- F. Isolate perimeter of gypsum panels from building structure, while maintaining continuity of fire-rated construction.
- G. Cant Panels: At projections into shaft exceeding 4 inches (102 mm), install 1/2- or 5/8-inch- (13- or 16-mm-) thick gypsum board cants covering tops of projections.
- H. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.
- I. Remove and replace panels that are wet, moisture damaged, or mold damaged.

END OF SECTION 09 21 19

SECTION 09 22 16

NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
  - 2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

1.4 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For dimpled steel studs and runners, from ICC-ES.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

2.2 FRAMING SYSTEMS

- A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
  - 1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
  - 2. Protective Coating: ASTM A 653/A 653M, G40 (Z120), hot-dip galvanized unless otherwise indicated.
- B. Studs and Runners: ASTM C 645.

1. Steel Studs and Runners:
    - a. Minimum Base-Metal Thickness:
      - 1) Indicated as 25 gage: 0.0188 inch (0.45 mm).
      - 2) Indicated as 22 gage: 0.0283 inch
      - 3) Indicated as 20 gage: 0.033 inch (0.84 mm).
    - b. Depth: As indicated on Drawings.
  - C. Slip-Type Head Joints: Where indicated, provide one of the following:
    1. Single Long-Leg Runner System: ASTM C 645 top runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs, installed with studs friction fit into top runner and with continuous bridging located within 12 inches (305 mm) of the top of studs to provide lateral bracing.
    2. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
    3. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
  - D. Flat Strap and Backing Plate: Steel sheet for blocking and bracing in length and width indicated.
    1. Minimum Base-Metal Thickness: As indicated on Drawings.
  - E. Cold-Rolled Channel Bridging: Steel, 0.053-inch (1.34-mm) minimum base-metal thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
    1. Depth: 1-1/2 inches (38 mm).
    2. Clip Angle: Not less than 1-1/2 by 1-1/2 inches (38 by 38 mm), 0.068-inch- (1.72-mm-) thick, galvanized steel.
  - F. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
    1. Minimum Base-Metal Thickness: 0.018 inch (0.45 mm).
    2. Depth: As indicated on Drawings.
  - G. Cold-Rolled Channels: 0.053-inch (1.34-mm) uncoated-steel thickness, with minimum 1/2-inch- (13-mm-) wide flanges.
    1. Depth: 3/4 inch (19 mm).
    2. Furring Brackets: Adjustable, corrugated-edge type of steel sheet with minimum uncoated-steel thickness of 0.033 inch (0.8 mm).
    3. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.
  - H. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), minimum uncoated-metal thickness of 0.018 inch (0.45 mm), and depth required to fit insulation thickness indicated.
- 2.3 SUSPENSION SYSTEMS
- A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

B. Hanger Attachments to Concrete:

1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
2. Powder-Actuated Fasteners: Suitable for application indicated, fabricated from corrosion-resistant materials with clips or other devices for attaching hangers of type indicated, and capable of sustaining, without failure, a load equal to 10 times that imposed by construction as determined by testing according to ASTM E 1190 by an independent testing agency.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.

1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide one of the following:

1. Asphalt-Saturated Organic Felt: ASTM D 226, Type I (No. 15 asphalt felt), nonperforated.
2. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.

1. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.
- B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.
  - C. Install bracing at terminations in assemblies.
  - D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

### 3.3 INSTALLING FRAMED ASSEMBLIES

- A. Install framing in accordance with *The Gypsum Construction Handbook* (published by USG), ASTM C 754 and the following.
- B. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
  - 1. Application: 16 inches (406 mm) o.c. unless otherwise indicated.
- C. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.
- D. Install studs so flanges within framing system point in same direction.
- E. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
  - 1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
  - 2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
    - a. Install two studs at each jamb unless otherwise indicated. Both studs shall be 20 gage (minimum 0.033 inch (0.84 mm) thick).
    - b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
    - c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
  - 3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
  - 4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
- F. Direct Furring: Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
- G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

### 3.4 INSTALLING SUSPENSION SYSTEMS

- A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
  - 1. Hangers: 48 inches (1219 mm) o.c.
  - 2. Carrying Channels (Main Runners): 48 inches (1219 mm) o.c.
  - 3. Furring Channels (Furring Members): 16 inches (406 mm) o.c.
- B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

- C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
    - a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
  3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
  4. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
  5. Do not connect or suspend steel framing from ducts, pipes, or conduit.
- D. Installation Tolerances: Install suspension systems that are level to within 1/8 inch in 12 feet (3 mm in 3.6 m) measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 09 22 16

SECTION 09 29 00

GYPSUM BOARD

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Interior gypsum board.
  - 2. Impact resistant gypsum board.
- B. Related Sections: Division 09, Section "Tiling" for cementitious backer board for the application of ceramic tile in showers.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
  - 2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
  - 3. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regionally manufactured and regionally extracted and manufactured materials. Include statement indicating cost for each regionally manufactured material.
    - a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
    - b. Include statement indicating location of manufacturer and point of extraction, harvest, or recovery for each raw material used in regionally extracted and manufactured materials. Indicate distance to Project and fraction by weight of each regionally manufactured material that is regionally extracted.
  - 4. Product Data for Credit IEQ 4.1: For adhesives used to laminate gypsum board panels to substrates, documentation including printed statement of VOC content.
- C. Samples: For the following products:
  - 1. Trim Accessories: Full-size Sample in 12-inch- (300-mm-) long length for each trim accessory indicated.
  - 2. Textured Finishes: 24 inch by 24 inch sample for each textured finish indicated and on same backing indicated for Work.

## 1.4 QUALITY ASSURANCE

- A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
- B. Mockups: Before beginning gypsum board installation, install mockups of at least 100 sq. ft. (9 sq. m) in surface area to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Install mockups for the following:
    - a. Each level of gypsum board finish indicated for use in exposed locations.
    - b. Each texture finish indicated.
  - 2. Apply or install final decoration indicated, including painting and wallcoverings, on exposed surfaces for review of mockups.
  - 3. Simulate finished lighting conditions for review of mockups.
  - 4. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.5 STORAGE AND HANDLING

- A. Store materials inside under cover and keep them dry and protected against damage from weather, condensation, direct sunlight, construction traffic, and other causes. Stack panels flat to prevent sagging.

## 1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with ASTM C 840 requirements or gypsum board manufacturer's written recommendations, whichever are more stringent.
- B. Do not install interior products until installation areas are enclosed and conditioned.
- C. Do not install panels that are wet, those that are moisture damaged, and those that are mold damaged.
  - 1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

## PART 2 - PRODUCTS

### 2.1 PANELS, GENERAL

- A. Recycled Content: Provide gypsum panel products with recycled content such that postconsumer recycled content plus one-half of preconsumer recycled content constitutes a minimum of 95 percent by weight.
- B. Size: Provide in maximum lengths and widths available that will minimize joints in each area and that correspond with support system indicated.

### 2.2 INTERIOR GYPSUM BOARD

- A. General: Complying with ASTM C 36/C 36M or ASTM C 1396/C 1396M, as applicable to type of gypsum board indicated and whichever is more stringent.

- B. Regular Type:
  - 1. Thickness: 5/8 inch.
  - 2. Long Edges: Tapered.
- C. Type X:
  - 1. Thickness: 5/8 inch (15.9 mm).
  - 2. Long Edges: Tapered.
- D. Ceiling Type: Manufactured to have more sag resistance than regular-type gypsum board.
  - 1. Thickness: As indicated, but not less than 5/8 inch.
  - 2. Long Edges: Tapered.
- E. Moisture- and Mold-Resistant Type: With moisture- and mold-resistant core and surfaces.
  - 1. Core: 5/8 inch (15.9 mm), Type X.
- F. Impact-Resistant Gypsum Board: ASTM C 1629/C 1629M, Level 3.
  - 1. Core: 5/8 inch (15.9 mm), Type X.
  - 2. Long Edges: Tapered.
  - 3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

### 2.3 EXTERIOR GYPSUM BOARD FOR SOFFITS

- A. Exterior Gypsum Soffit Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.
  - 1. Core: 5/8 inch (15.9 mm), Type X, unless indicated otherwise.

### 2.4 TRIM ACCESSORIES

- A. Interior Trim: ASTM C 1047.
  - 1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized steel sheet.
  - 2. Shapes:
    - a. Cornerbead.
    - b. LC-Bead: J-shaped; exposed long flange receives joint compound.
    - c. L-Bead: L-shaped; exposed long flange receives joint compound.
    - d. U-Bead: J-shaped; exposed short flange does not receive joint compound.
    - e. Expansion (control) joint.

### 2.5 JOINT TREATMENT MATERIALS

- A. General: Comply with ASTM C 475/C 475M.
- B. Joint Tape:
  - 1. Interior Gypsum Wallboard: Paper.
  - 2. Cementitious Backing Panels: As recommended by panel manufacturer
- C. Joint Compound for Interior Gypsum Wallboard: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

1. Prefilling: At open joints and damaged surface areas, use setting-type taping compound.
2. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use drying-type, all-purpose compound.
  - a. Use setting-type compound for installing paper-faced metal trim accessories.
3. Fill Coat: For second coat, use drying-type, all-purpose compound.
4. Finish Coat: For third coat, use drying-type, all-purpose compound.
5. Skim Coat: For final coat, use drying-type, all-purpose compound.

D. Joint Compound for Tile Backing Panels:

1. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.
2. Cementitious Backing Panels: As recommended by panel manufacturer

## 2.6 AUXILIARY MATERIALS

- A. General: Provide auxiliary materials that comply with referenced installation standards and manufacturer's written recommendations.
- B. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers manufactured from glass, slag wool, or rock wool.
  1. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.
- C. Acoustical Sealant: As specified in Division 07 Section "Joint Sealants."
  1. Provide sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- D. Thermal Insulation: As specified in Division 07 Section "Thermal Insulation."
- E. Vapor Retarder: As specified in Division 07 Section "Thermal Insulation."

## 2.7 FINISHES

- A. Primer: As recommended by textured finish manufacturer.
- B. Non-Aggregate Finish: Pre-mixed, vinyl texture finish for spray application.
  1. Texture: Orange Peel.
- C. Smooth finish where indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames and framing, for compliance with requirements and other conditions affecting performance.
- B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 APPLYING AND FINISHING PANELS, GENERAL

- A. Comply with ASTM C 840 and the USG "Gypsum Construction Handbook."
- B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than 1/16 inch (1.5 mm) of open space between panels. Do not force into place.
- D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.
- E. Form control and expansion joints with space between edges of adjoining gypsum panels.
- F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.
  - 1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. (0.7 sq. m) in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow 1/4- to 3/8-inch- (6.4- to 9.5-mm-) wide joints to install sealant.
- G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations, and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- H. Install sound attenuation blankets before installing gypsum panels, unless blankets are readily installed after panels have been installed on one side.

### 3.3 APPLYING INTERIOR GYPSUM BOARD

- A. Install interior gypsum board in the following locations:
  - 1. Regular Type: As indicated on Drawings.
  - 2. Type X: As indicated on Drawings.
  - 3. Ceiling Type: Ceiling surfaces.
  - 4. Moisture- and Mold-Resistant Type: As indicated on Drawings.
  - 5. Cementitious Backer Board: Where indicated.
- B. Single-Layer Application:
  - 1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing, unless otherwise indicated.
  - 2. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless otherwise indicated or required by fire-resistance-rated assembly, and minimize end joints.
    - a. Stagger abutting end joints not less than one framing member in alternate courses of panels.
    - b. At high walls, install panels horizontally, unless otherwise indicated or required by fire-resistance-rated assembly.

3. Fastening Methods: Apply gypsum panels to wood supports with steel drywall screws.

C. Multilayer Application:

1. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
2. On Z-furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
3. Fastening Methods: As indicated by wall type.

### 3.4 INSTALLING TRIM ACCESSORIES

- A. General: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
- B. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.
- C. Interior Trim: Install in the following locations:
  1. Cornerbead: Use at outside corners.
  2. LC-Bead: Use at exposed panel edges.
  3. L-Bead: Use where indicated.
  4. U-Bead: Use where indicated.
  5. Reveals: Use where indicated.

### 3.5 FINISHING GYPSUM BOARD

- A. General: Treat gypsum board joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.
- B. Prefill open joints and damaged surface areas.
- C. Apply joint tape over gypsum board joints, except those with trim having flanges not intended for tape.
- D. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
  1. Level 1: Ceiling plenum areas, concealed areas, and where indicated.
  2. Level 2: Panels that are substrate for tile.
  3. Level 3: Where indicated.
  4. Level 4: Typical locations, apply textured finish. Smooth finish where indicated.
  5. Level 5: Surfaces to receive gloss or semi-gloss paint and smooth finish.

### 3.6 PROTECTION

- A. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.
- B. Remove and replace panels that are wet, moisture damaged, and mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

END OF SECTION 09 29 00

## SECTION 09 30 13

### TILING

#### 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. Porcelain tile.
  - 2. Ceramic tile.

##### 1.3 DEFINITIONS

- A. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
- B. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.1A, ANSI A108.1B, ANSI A108.1C, ANSI A108.4, ANSI A108.5, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.12, ANSI A108.13, ANSI A108.14, ANSI A108.15, ANSI A108.16, and ANSI A108.17, which are contained in "American National Standard Specifications for Installation of Ceramic Tile."

##### 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Initial Selection: For each type of tile and grout indicated. Include Samples of accessories involving color selection.
- C. Samples for Verification:
  - 1. Full-size units of each type and composition of tile and for each color and finish required.

##### 1.5 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockup of each type of wall tile installation (approximately 16 square feet).
  - 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
- B. Store tile and cementitious materials on elevated platforms, under cover, and in a dry location.
- C. Store aggregates where grading and other required characteristics can be maintained and contamination can be avoided.
- D. Store liquid materials in unopened containers and protected.

## 1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.
- B. Substrates shall be between 40 deg. F and 90 deg. F and structurally sound, clean and free of dirt, oil grease, paint, concrete sealers or curing compounds as per ANSI A108.01.

## 1.8 EXTRA MATERIALS

- A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Grout: Furnish quantity of grout equal to 3 percent of amount installed for each type, composition, and color indicated.
  - 2. Tile: Furnish quantity of tile equal to 3 percent of amount installed.

## PART 2 - PRODUCTS

### 2.1 PRODUCTS, GENERAL

- A. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in this Section, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
- B. Tile: Design is based on the products and manufacturers indicated. Information on Drawings and in Specifications establishes requirements for product's aesthetic effects and performance characteristics. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components. Performance characteristics are indicated by criteria subject to verification by one or more methods including but not limited to manufacturer testing, preconstruction testing, field testing, and in-service performance. Products by other manufacturers will be considered but are subject to Architect approval and compliance with requirements. Products by other manufacturers shall be submitted for Architect review and approval in accordance with substitution submission procedures.

### 2.2 THRESHOLDS

- A. General: Fabricate to sizes and profiles indicated or required to provide transition between adjacent floor finishes.

1. Bevel edges at 1:2 slope, with lower edge of bevel aligned with or up to 1/16 inch (1.5 mm) above adjacent floor surface. Finish bevel to match top surface of threshold. Limit height of threshold to 1/2 inch (12.7 mm) or less above adjacent floor surface.
- B. Thresholds: Solid surface material, "Avonite" (Price group B) or Architect approved comparable product.
1. Color: As selected from manufacturer's full range.

## 2.3 SETTING MATERIALS

- A. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.
1. Latex-Portland Cement Mortar (Thin Set): Provide mortar that complies with requirements for nonsagging mortar in addition to the other requirements in ANSI A118.4 and ANSI 108.5.
  2. Basis-of-Design Product: Subject to compliance with requirements, provide "Spectral Lock Pro," by Laticrete or comparable product by one of the following:
    - a. Laticrete International, Inc.
    - b. MAPEI Corporation.

## 2.4 GROUT MATERIALS

- A. Polymer-Modified Tile Grout: ANSI A118.7 polymer-modified sanded grout, use unsanded grout for joints less than 1/8 inch.

## 2.5 MISCELLANEOUS MATERIALS

- A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
- B. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
- C. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Bonsal American; an Oldcastle company; Grout Sealer.
    - b. Bostik, Inc.; CeramaSeal Grout & Tile Sealer.
    - c. C-Cure; Penetrating Sealer 978.
    - d. Custom Building Products; Grout Sealer.
    - e. Jamo Inc.; Penetrating Sealer.
    - f. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout.
    - g. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
    - h. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
    - i. TEC; a subsidiary of H. B. Fuller Company; Grout Sealer.

## 2.6 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.

- B. Add materials, water, and additives in accurate proportions.
- C. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

## 2.7 ACCESSORIES

- A. Reveals and accessories as indicated. Products by other manufacturers will be considered but are subject to Architect approval and compliance with requirements.
- B. Stainless Steel Transition Strips: Transition between wall tile and flooring: Provide cove (inside corner) at base where indicated. Provide "Dilex" as manufactured by Schluter Systems or other metal cove (inside corner) acceptable to the Architect.
  - 1. Provide stainless steel or clear aluminum finish.
  - 2. Include end cap and other associated pieces for complete installation.
  - 3. Select proper profile according to tile thickness and floor finish material.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.
  - 1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
  - 2. Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 TILE INSTALLATION

- A. Comply with TCNA's "Handbook for Ceramic Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 Series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
- B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.
- D. Jointing Pattern: Lay tile in modified running bond pattern as indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

- E. Joint Widths: As indicated.
- F. Grout Sealer: Apply grout sealer to cementitious grout joints according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

### 3.3 CLEANING AND PROTECTING

- A. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
  - 1. Remove latex-portland cement grout residue from tile as soon as possible.
  - 2. Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.
- B. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
- C. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
- D. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.

### 3.4 INTERIOR TILE INSTALLATION SCHEDULE

- A. Interior Floor Installations, Concrete Subfloor:
  - 1. Tile Installation F113: Thin-set mortar; TCNA F113.
- B. Interior Wall Installations:
  - 1. Tile Installation W242 or W243: Thin-set mortar on gypsum board; TCNA W242 or W243.
    - a. Thin-Set Mortar: Latex-portland cement mortar.
    - b. Grout: Polymer-modified sanded grout use unsanded grout for joints less than 1/8 inch.
- C. Subject to Architect's written approval, Contractor may use alternate TCNA installation methods.

END OF SECTION 09 30 13

SECTION 09 51 13

ACOUSTICAL PANEL CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes acoustical panels and exposed suspension systems for ceilings.
- B. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating costs for each product having recycled content.
  - 2. Product Data for Credit EQ 4.1: For sealants, documentation including printed statement of VOC content.
- C. Samples: For each exposed product and for each color and texture specified, 6 inches (150 mm) in size.
- D. Samples for Initial Selection: For components with factory-applied color finishes.
- E. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.
  - 1. Acoustical Panel: Set of 6-inch- (150-mm-) square (min.) samples of each type, color, pattern, and texture.
  - 2. Exposed Suspension-System Members, Moldings, and Trim: Set of 6-inch- (150-mm-) long Samples of each type, finish, and color.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For finishes to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Panels: Full-size panels equal to 2 percent of quantity installed.
2. Suspension-System Components: Quantity of each exposed component equal to 2 percent of quantity installed.

#### 1.6 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to NVLAP for testing indicated.
- B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  1. Build mockup of typical ceiling area as shown on Drawings.
  2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical panels, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical panels, permit them to reach room temperature and stabilized moisture content.
- C. Handle acoustical panels carefully to avoid chipping edges or damaging units in any way.

#### 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install acoustical panel ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  1. Flame-Spread Index: Comply with ASTM E 1264 for Class A materials.
  2. Smoke-Developed Index: 50 or less.

#### 2.2 ACOUSTICAL PANELS, GENERAL

- A. Source Limitations:
  1. Acoustical Ceiling Panel: Obtain each type from single source from single manufacturer.
  2. Suspension System: Obtain each type from single source from single manufacturer.

### ACOUSTICAL PANEL CEILINGS

- B. Source Limitations: Obtain each type of acoustical ceiling panel and supporting suspension system from single source from single manufacturer.
- C. Acoustical Panel Standard: Provide manufacturer's standard panels of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.
  - 1. Mounting Method for Measuring NRC: Type E-400; plenum mounting in which face of test specimen is 15-3/4 inches (400 mm) away from test surface according to ASTM E 795.
- D. Acoustical Panel Colors and Patterns: Match appearance characteristics indicated for each product type.

2.3 CAST OR MOLDED, MINERAL-BASE ACOUSTICAL PANELS FOR ACOUSTICAL PANEL CEILING

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Acoustical Panels by one of the following:
  - 1. Armstrong World Industries, Inc.
  - 2. CertainTeed Corp.
  - 3. Chicago Metallic Corporation.
  - 4. USG Interiors, Inc.; Subsidiary of USG Corporation.
- B. Classification: Provide panels complying with ASTM E 1264 for type, form, and pattern as follows:
  - 1. Type and Form: Type IV, mineral base with painted finish; Form 2, cast or molded.
  - 2. Pattern: E.
- C. Color: White .
- D. LR: Not less than .89
- E. NRC: Not less than 0.70.
- F. CAC: Not less than CAC 35.
- G. Edge Detail: Beveled Tegular.
- H. Thickness: 3/4 inch (19 mm).
- I. Size: 24 inches by 24 inches (nominal).

2.4 CUSTOM DIMENSIONAL FIBERGLASS PANELS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide dimensional fabric covered fiberglass panels as manufactured by Acoustic Enterprises, Inc. or comparable product acceptable to the Architect.
- B. Color: As selected from manufacturer's full range.
- C. Pattern: Custom pattern as designed by Architect.
- D. Panel Fabric: "Guilford of Maine."

- E. NRC: Not less than 1.05.
- F. Edge Detail: Reveal sized to fit flange of exposed suspension-system members.
- G. Thickness: 2 inches.
- H. Size: 48 inches by 48 inches (nominal).

## 2.5 METAL SUSPENSION SYSTEMS

- A. Metal Suspension-System Standard: Provide manufacturer's standard direct-hung metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.
- B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. .
- C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:
  - 1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.
  - 2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) (12 gage) diameter wire.
- D. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.
- E. Wide-Face, Capped, Double-Web, Steel Suspension System: Main and cross runners roll formed from cold-rolled steel sheet; prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, not less than G30 (Z90) coating designation; with prefinished 15/16-inch- (24-mm-) wide metal caps on flanges.
  - 1. Structural Classification: Intermediate-duty system for 24" by 24' panels. Heavy-duty system for 48" by 48" fiberglass panels.
  - 2. Face Design: Flat, flush.
  - 3. Cap Material: Steel cold-rolled sheet.
  - 4. Exposed button rivets or other exposed fasteners will not be permitted.
  - 5. Color: Painted white for 24" by 24" panels. Painted custom color as selected by Architect for 48" by 48" panels.

## 2.6 METAL EDGE MOLDINGS AND TRIM

- A. Basis-of-Design Product: Subject to compliance with requirements, provide "Axiom" as manufactured by Armstrong World Industries, Inc. or comparable product by one of the following:
  - 1. Armstrong World Industries, Inc.
  - 2. CertainTeed Corp.
  - 3. Chicago Metallic Corporation.
  - 4. Fry Reglet Corporation.
  - 5. Gordon, Inc.
  - 6. USG Interiors, Inc.; Subsidiary of USG Corporation.
- B. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Type and profile indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that comply with seismic design

requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, including structural framing to which acoustical panel ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and with requirements for installation tolerances and other conditions affecting performance of acoustical panel ceilings.
- B. Examine acoustical panels before installation. Reject acoustical panels that are wet, moisture damaged, or mold damaged.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Measure each ceiling area and establish layout of acoustical panels to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width panels at borders, and comply with layout shown on reflected ceiling plans.

### 3.3 INSTALLATION

- A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."
- B. Do not use exposed fasteners, including pop rivets or button rivets, on grid face.**
- C. Suspend ceiling hangers from building's structural members and as follows:
  - 1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
  - 2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
  - 3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
  - 4. Secure wire hangers to ceiling-suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  - 5. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels or other supplemental support for attachment of hanger wires.
  - 6. Do not attach hangers to steel deck tabs.
  - 7. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.

8. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.
- D. Install edge moldings and trim of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical panels.
    1. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
    2. Do not use exposed fasteners, including pop rivets, on moldings and trim.
  - E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.
  - F. Install acoustical panels with undamaged edges and fit accurately into suspension-system runners and edge moldings. Scribe and cut panels at borders and penetrations to provide a neat, precise fit.
    1. Arrange directionally patterned acoustical panels as indicated on reflected ceiling plans. If not indicated, install panels with pattern running in one direction parallel to long axis of space.
    2. For reveal-edged panels on suspension-system runners, install panels with bottom of reveal in firm contact with top surface of runner flanges.
    3. Paint cut edges of panel remaining exposed after installation; match color of exposed panel surfaces using coating recommended in writing for this purpose by acoustical panel manufacturer.

#### 3.4 CLEANING

- A. Clean exposed surfaces of acoustical panel ceilings, including trim, edge moldings, and suspension-system members. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 09 51 13

SECTION 09 61 00

FLOORING TREATMENT (SEALERS)

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes surface preparation and application of high-performance sealer systems on the following substrates:
  - 1. Interior Substrates: Concrete, horizontal surfaces.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include preparation requirements and application instructions.
- B. LEED Submittals:
  - 1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
  - 2. Product Data for Credit IEQ 4.2: For liquid-applied flooring components, documentation including printed statement of VOC content.
- C. Samples: For each type of sealer system and in each color and gloss of topcoat indicated.

1.3 MAINTENANCE MATERIAL SUBMITTALS

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

1.4 QUALITY ASSURANCE

- A. Mockups: Apply mockups of each sealer system indicated to verify preliminary selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Architect will select one surface to represent surfaces and conditions for application of sealer system specified in Part 3.
    - a. Floor Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in other Part 2 articles for the paint category indicated.

## 2.2 HIGH-PERFORMANCE CONCRETE SEALER, GENERAL

### A. Material Compatibility:

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

### B. Colors: As selected by Architect from manufacturer's full range of colors.

## 2.3 CLEAR INTERIOR CONCRETE FLOOR SEALER SYSTEM

### A. Permanent Sealer/Hardener: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. "Euco Diamond Hard," Euclid Chemical Co.
2. "Ashford Formula," Curecrete Distribution, Inc.
3. "ChemTec One," ChemTec International

## PART 3 - EXECUTION

### 3.1 EXAMINATION

#### A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - a. Concrete: 12 percent.

#### B. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

#### C. Proceed with sealer application only after unsatisfactory conditions have been corrected.

1. Beginning sealer application constitutes Contractor's acceptance of substrates and conditions.

### 3.2 PREPARATION

#### A. Comply with manufacturer's written instructions and recommendations applicable to substrates indicated.

#### B. Clean substrates of substances that could impair bond of sealers, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

### 3.3 APPLICATION

#### A. Apply high-performance sealers according to manufacturer's written instructions.

#### B. Apply sealers to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 CLEANING AND PROTECTION

- A. Protect work of other trades against damage from sealer operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
- B. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

END OF SECTION 09 61 00

SECTION 09 65 13

RESILIENT WALL BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Resilient base.
  - 2. Transition molding

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. LEED Submittals:
  - 1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
  - 2. Product Data for Credit IEQ 4.3: For adhesives, documentation including printed statement of VOC content.
  - 3. Product Data for Credit IEQ 4.3: For resilient stair accessories, documentation from an independent testing agency indicating compliance with the FloorScore standard.
- C. Samples for Verification: For each type of product indicated, in manufacturer's standard-size Samples but not less than 12 inches long, of each resilient product color, texture, and pattern required.

1.4 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
  - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. FloorScore Compliance: Resilient base shall comply with requirements of FloorScore certification.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

## 1.6 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F, in spaces to receive resilient products during the following time periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Install resilient products after other finishing operations, including painting, have been completed.

## 1.7 EXTRA MATERIALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

## PART 2 - PRODUCTS

### 2.1 RESILIENT BASE

- A. Resilient Base:
  - 1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Johnsonite, Inc., A Tarkett Company.
    - b. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
    - c. Flexco, Inc.
    - d. Roppe Corporation, USA.
- B. Resilient Base Standard: ASTM F 1861.
  - 1. Material Requirement: 100 percent rubber, Type TS (rubber, vulcanized thermoset) .
  - 2. Manufacturing Method: Group 1 (solid, homogeneous).
  - 3. Style: Cove (base with toe) at typical locations. Straight (flat or toeless) where indicated.
- C. Minimum Thickness: 0.125 inch.
- D. Height: 6 inches, unless indicated otherwise.
- E. Lengths: Coils in manufacturer's standard length but not less than 30 ft.
- F. Outside Corners: Job formed.
- G. Inside Corners: Job formed.
- H. Finish: As selected by Architect from manufacturer's full range.
- I. Colors and Patterns: Match Architect's sample.

## 2.2 TRANSITION MOLDING

- A. General: Resilient transitional moldings, ADA compliant and as indicated.
- B. Material: Homogeneous composition of polyvinyl chloride (PVC) with additives and colorants.
  - 1. Formulation shall exceed ASTM E 648 Class 1, flammability requirements.
  - 2. Moldings shall be adhesive applied.
  - 3. Manufacturers: Basis of Design: Johnsonite, Inc. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Johnsonite, Inc., A Tarkett Company.
    - b. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
    - c. Flexco, Inc.
    - d. Roppe Corporation, USA.

## 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.
  - 1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
    - a. Cove Base Adhesives: Not more than 50 g/L.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.
- B. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- C. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- D. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

### 3.3 RESILIENT BASE INSTALLATION

- A. Comply with manufacturer's written instructions for installing resilient base.
- B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.
- C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.
- D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
- E. Do not stretch resilient base during installation.
- F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.
- G. Job-Formed Corners:
  1. Outside Corners: Use straight pieces of maximum lengths possible. Form without producing discoloration (whitening) at bends.
  2. Inside Corners: Use straight pieces of maximum lengths possible.

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.
- B. Perform the following operations immediately after completing resilient product installation:
  1. Remove adhesive and other blemishes from exposed surfaces.
  2. Sweep and vacuum surfaces thoroughly.
  3. Damp-mop surfaces to remove marks and soil.
- C. Protect resilient products from marks, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

END OF SECTION 09 65 13

SECTION 09 65 19

RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Vinyl composition floor tile.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. LEED Submittals:
  - 1. Product Data for Credit IEQ 4.1: For adhesives, sealants, documentation including printed statement of VOC content.
  - 2. Product Data for Credit IEQ 4.3: For adhesives, documentation including printed statement of VOC content.
  - 3. Product Data for Credit IEQ 4.3: For resilient tile flooring, documentation from an independent testing agency indicating compliance with the FloorScore standard.
- C. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
  - 1. Show details of special patterns.
- D. Samples: Full-size units of each color and pattern of floor tile required.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: For resilient tile flooring, as determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.
  - 1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.
- B. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore certification.

## 2.2 VINYL COMPOSITION FLOOR TILE

- A. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. AB; American Biltrite.
  - 2. Armstrong World Industries, Inc.
  - 3. Congoleum Corporation.
  - 4. Mannington Mills, Inc.
- B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch (3.2 mm).
- E. Size: 12 by 12 inches (305 by 305 mm).
- F. Colors and Patterns: Match Architect's samples (selected from Armstrong World Industries, Inc. samples).

## 2.3 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
  - 1. Adhesives shall comply with the following limits for VOC content:
    - a. Vinyl Composition Tile Adhesives: 50 g/L or less.
    - b. Rubber Floor Adhesives: 60 g/L or less.
- C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM F 710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
- C. Access Flooring Panels: Remove protective film of oil or other coating using method recommended by access flooring manufacturer.

- D. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.
- E. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
- F. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### 3.2 FLOOR TILE INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor tile.
- B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
  - 1. Lay tiles in pattern indicated.
- C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
  - 1. Lay tiles with grain running in one direction in pattern of colors and sizes indicated.
- D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Install floor tiles on covers for telephone and electrical ducts, building expansion-joint covers, and similar items in finished floor areas. Maintain overall continuity of color and pattern between pieces of tile installed on covers and adjoining tiles. Tightly adhere tile edges to substrates that abut covers and to cover perimeters.
- H. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

### 3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Floor Polish: Remove soil, adhesive, and blemishes from floor tile surfaces before applying liquid floor polish.
  - 1. Apply one coat.
- C. Cover floor tile until Substantial Completion.

END OF SECTION 09 65 19

SECTION 09 65 40

RUBBER FLOORING, TREADS AND RISERS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Rubber sheet floor covering, without backing.
2. Rubber stair tread and risers of matching material.

1.2 ACTION SUBMITTALS

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

B. LEED Submittals:

1. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
2. Product Data for Credit IEQ 4.3: For adhesives, documentation including printed statement of VOC content.
3. Product Data for Credit IEQ 4.3: For resilient sheet flooring, documentation from an independent testing agency indicating compliance with the FloorScore standard.

C. Shop Drawings: For each type of floor covering. Include floor covering layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.

D. Samples: In manufacturer's standard size, but not less than 6-by-9-inch (150-by-230-mm) sections of each different color and pattern of floor covering required.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer in spaces to receive floor coverings.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer.

C. Close spaces to traffic during floor covering installation.

- D. Close spaces to traffic for 48 hours after floor covering installation.
- E. Install floor coverings after other finishing operations, including painting, have been completed.

## PART 2 - PRODUCTS

### 2.1 RUBBER SHEET FLOOR COVERING

- A. Products: Subject to compliance with requirements, provide "MicroTone" Speckle colorways with hammered texture flooring and strair treads and risers as manufactured by Johnsonite, available products that may be incorporated into the Work subject to Architect approval, include the following:
  - 1. Flexco;
  - 2. Johnsonite;
  - 3. PRF USA Inc.;
  - 4. R.C.A. Rubber Company (The);
- B. Product Name: "MicroTone" with hammered texture.
- C. Material: 100% synthetic rubber.
- D. FloorScore Compliance: Resilient sheet flooring shall comply with requirements of FloorScore certification.
- E. Surface: Hammered.
- F. Color: As selected from manufacture's full range (no exceptions).
- G. Comply with requirements for ASTM F 1344 Standard Specification for Rubber Floor Tile, Class 1-B.
- H. Overall thickness: 0.125" (3.175mm).
- I. Tile size: 24" x 24" (61 cm x 61 cm).
- J. Hardness: ASTM D 2240 Standard Test Method for Rubber Property—Durometer Hardness: Not less than 85 Shore A.
- K. Abrasion: ASTM D 3389 Standard Test Method for Coated Fabrics Abrasion Resistance: < 1.00 gram weight loss.
- L.
- M. ASTM D 2047, Standard Test Method for Static Coefficient of Friction of Polish-Coated Flooring: Exceeds Federal Standards and A.D.A. requirements for slip-resistant.
- N. ASTM F 970, Standard Test Method for Static Load Limit – passes at 250 PSI.
- O. ASTM E 648, Standard Test method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source – Class 1.
- P. SCS FloorScore® Certified
- Q. Phthalate, chlorine and halogen free.

- R. Cleaning: Flooring surface shall have the ability to be cleaned and maintained without the use of any chemicals that may be hazardous or containing any teratogenic, mutagenic or any other ingredients known to be carcinogenic. Manufacturer shall make available a cleaning system that effectively cleans the flooring surface using water, cleaning pads and a suitable cleaning machine, without the use of factory and/or field-applied coatings.
- S. Provide stair treads and risers of matching material by same manufacturer with contrasting tread toe strip for visually impaired.

## 2.2 INSTALLATION MATERIALS

- A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.
- B. Adhesives: Water-resistant type recommended by manufacturer to suit floor covering and substrate conditions indicated.
  - 1. Adhesives shall have a VOC content of not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
  - 2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- C. Floor Polish: Provide protective liquid floor polish products as recommended by manufacturer.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of floor coverings.
- B. Concrete Substrates: Prepare according to ASTM F 710.
  - 1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
  - 2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
  - 4. Moisture Testing: Perform tests recommended by manufacturer. Proceed with installation only after substrates pass testing.
- C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.
- D. Do not install floor coverings until they are same temperature as space where they are to be installed.
  - 1. Move floor coverings and installation materials into spaces where they will be installed at least 48 hours in advance of installation.
- E. Sweep and vacuum clean substrates to be covered by floor coverings immediately before installation.

### 3.2 FLOOR COVERING INSTALLATION

- A. Comply with manufacturer's written instructions for installing floor coverings.
- B. Unroll floor coverings and allow them to stabilize before cutting and fitting.
- C. Lay out floor coverings as follows:
  - 1. Maintain uniformity of floor covering direction.
  - 2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least 6 inches (152 mm) away from parallel joints in floor covering substrates.
  - 3. Match edges of floor coverings for color shading at seams.
  - 4. Avoid cross seams.
- D. Scribe and cut floor coverings to butt neatly and tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, and door frames.
- E. Extend floor coverings into toe spaces, door reveals, closets, and similar openings.
- F. Maintain reference markers, holes, or openings that are in place or marked for future cutting by repeating on floor coverings as marked on substrates. Use chalk or other nonpermanent marking device.
- G. Adhere floor coverings to substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

### 3.3 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of floor covering.
- B. Floor Polish: Remove soil, visible adhesive, and surface blemishes from floor covering before applying liquid floor polish.
  - 1. Apply one coat.
- C. Cover floor coverings until Substantial Completion.

END OF SECTION 09 65 40

SECTION 09 66 23

RESINOUS MATRIX TERRAZZO FLOORING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:

- 1. Thin-set, epoxy-resin terrazzo flooring.

- B. Related Requirements:

- 1. Section 07 92 00 "Joint Sealants" for sealants installed with terrazzo.

1.3 DEFINITIONS

- A. Aggregate: Marble chips or other types of aggregate.

1.4 PREINSTALLATION MEETINGS

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

- 1. Review methods and procedures related to terrazzo including, but not limited to, the following:

- a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
    - b. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
    - c. Review special terrazzo designs and patterns.

1.5 ACTION SUBMITTALS

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

- B. LEED Submittals:

- 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
  - 2. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
  - 3. Product Data for Credit IEQ 4.3: For sealers, documentation including printed statement of VOC content.
  - 4. Product Data for Credit IEQ 4.3: For terrazzo flooring, documentation from an independent testing agency indicating compliance with the FloorScore Standard.

- C. Shop Drawings: Include terrazzo installation requirements. Include plans, elevations, sections, component details, and attachments to other work. Show layout of the following:
  - 1. Divider strips.
  - 2. Accessory strips.
  - 3. Terrazzo patterns.
- D. Samples: For each exposed product and for each color and texture specified, 6 inches (150 mm) in size.
- E. Samples for Initial Selection: NTMA color plates showing the full range of colors and patterns available for each terrazzo type.
- F. Samples for Verification: For each type, material, color, and pattern of terrazzo and accessory required showing the full range of color, texture, and pattern variations expected. Label each terrazzo sample to identify manufacturer's matrix color and aggregate types, sizes, and proportions. Prepare Samples of same thickness and from same material to be used for the Work, in size indicated below:
  - 1. Terrazzo: 6-inch- (150-mm-) square Samples.
  - 2. Accessories: 6-inch- (150-mm-) long Samples of each exposed strip item required.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For terrazzo to include in maintenance manuals.

#### 1.7 QUALITY ASSURANCE

- A. Installer Qualifications:
  - 1. Engage an installer who is a contractor member of NTMA.
  - 2. Engage an installer who is certified in writing by terrazzo manufacturer as qualified to install manufacturer's products.
- B. Source Limitations: Obtain primary terrazzo materials from single source from single manufacturer. Provide secondary materials including patching and fill material, joint sealant, and repair materials of type and from source recommended by manufacturer of primary materials.
- C. Source Limitations for Aggregates: Obtain each color, grade, type, and variety of granular materials from single source with resources to provide materials of consistent quality in appearance and physical properties.
- D. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Build mockups for terrazzo including accessories.
    - a. Size: Minimum 100 sq. ft. (9 sq. m) of typical poured-in-place flooring condition for each color and pattern in locations directed by Architect.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in supplier's original wrappings and containers, labeled with source's or manufacturer's name, material or product brand name, and lot number if any.

- B. Store materials in their original, undamaged packages and containers, inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

## 1.9 FIELD CONDITIONS

- A. Environmental Limitations: Comply with manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting terrazzo installation.
- B. Field Measurements: Verify actual dimensions of construction contiguous with precast terrazzo by field measurements before fabrication.
- C. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.
- D. Close spaces to traffic during terrazzo application and for not less than 24 hours after application unless manufacturer recommends a longer period.
- E. Control and collect water and dust produced by grinding operations. Protect adjacent construction from detrimental effects of grinding operations.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. NTMA Standards: Comply with NTMA's "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.
- B. FloorScore Compliance: Terrazzo floors shall comply with requirements of FloorScore Standard.

### 2.2 EPOXY-RESIN TERRAZZO

- A. Epoxy-Resin Terrazzo: Comply with NTMA's "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and aggregate proportions and mixing.
  - 1. Thickness: 3/8 inch (9.5 mm) nominal.
  - 2. Custom Mix Colors: Architect will select multiple colors and aggregate formulas for the pattern indicated on the drawings. For bidding, provide pricing base on the following formula:
    - a. Epoxy Color: Medium blue.
    - b. 50 percent Inyo Grey, size: two thirds No. 1 and one third No. 2.
    - c. 5 percent Raven Black, size No. 2.
    - d. 5 percent White Rose, size: two thirds No. 1 and one third No. 2.
    - e. 25 percent Mother of Pearl, size: two thirds No. 2 and one third No. 3.
  - 3. Costs will be adjusted by Change Order after Architect has approved final selections and mixes.
- B. Materials:
  - 1. Primer: Manufacturer's product recommended for substrate and use indicated.
  - 2. Epoxy-Resin Matrix: Manufacturer's standard recommended for use indicated and in color required for mix indicated.
    - a. Physical Properties without Aggregates:
      - 1) Hardness: 60 to 85 per ASTM D 2240, Shore D.

- 2) Minimum Tensile Strength: 3000 psi (20.7 MPa) per ASTM D 638 for a 2-inch (51-mm) specimen made using a "C" die per ASTM D 412.
- 3) Minimum Compressive Strength: 10,000 psi (6.9 MPa) per ASTM D 695, Specimen B cylinder.
- 4) Chemical Resistance: No deleterious effects by contaminants listed below after seven-day immersion at room temperature per ASTM D 1308.
  - a) Distilled water.
  - b) Mineral water.
  - c) Isopropanol.
  - d) Ethanol.
  - e) 0.025 percent detergent solution.
  - f) 1.0 percent soap solution.
  - g) 10 percent sodium hydroxide.
  - h) 10 percent hydrochloric acid.
  - i) 30 percent sulfuric acid.
  - j) 5 percent acetic acid.

b. Physical Properties with Aggregates: For resin blended with Georgia white marble, ground, grouted, and cured per requirements in NTMA's "Terrazzo Specifications and Design Guide"; comply with the following:

- 1) Flammability: Self-extinguishing, maximum extent of burning 1/4 inch (6.35 mm) per ASTM D 635.
- 2) Thermal Coefficient of Linear Expansion: 0.0025 inch/inch per deg F (0.0025 mm/mm per 0.5556 deg C) for temperature range of minus 12 to plus 140 deg F (minus 24 to plus 60 deg C) per ASTM D 696.

3. Aggregates: Comply with NTMA gradation standards for mix indicated and contain no deleterious or foreign matter.

- a. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131.
- b. 24-Hour Absorption Rate: Less than 0.75 percent.
- c. Dust Content: Less than 1.0 percent by weight.

4. Finishing Grout: Resin based.

## 2.3 STRIP MATERIALS

A. Heavy-Top Divider Strips: L-type angle or T-type in depth required for topping thickness indicated.

1. Top-Section Material: White-zinc alloy.
2. Top-Section Width: As indicated, but not less than 1/4 inch (6.4 mm).

B. Control-Joint Strips: Separate, double L-type angles, positioned back to back, that match material and color of divider strips and in depth required for topping thickness indicated.

## 2.4 MISCELLANEOUS ACCESSORIES

A. Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use.

1. Adhesives shall have a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. Anchoring Devices:

1. Strips: Provide mechanical anchoring devices or adhesives for strip materials as recommended by manufacturer and required for secure attachment to substrate.
- C. Patching and Fill Material: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.
- D. Resinous Matrix Terrazzo Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by sealer manufacturer for use on terrazzo type indicated.
- E. Sealer: Slip- and stain-resistant, penetrating-type sealer that is chemically neutral; does not affect terrazzo color or physical properties; is recommended by sealer manufacturer; and complies with NTMA's "Terrazzo Specifications and Design Guide" for terrazzo type indicated.
  1. Surface Friction: Not less than 0.6 according to ASTM D 2047.
  2. Acid-Base Properties: With pH factor between 7 and 10.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

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

#### 3.2 PREPARATION

- A. Clean substrates of substances, including oil, grease, and curing compounds, that might impair terrazzo bond. Provide clean, dry, and neutral substrate for terrazzo application.
- B. Concrete Slabs:
  1. Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with terrazzo.
    - a. Shot-blast surfaces with an apparatus that abrades the concrete surface, contains the dispensed shot within the apparatus, and recirculates the shot by vacuum pickup.
    - b. Repair damaged and deteriorated concrete according to terrazzo manufacturer's written recommendations.
    - c. Use patching and fill material to fill holes and depressions in substrates according to terrazzo manufacturer's written instructions.
- C. Protect other work from water and dust generated by grinding operations. Control water and dust to comply with environmental protection regulations.
  1. Erect and maintain temporary enclosures and other suitable methods to limit water damage and dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.

#### 3.3 EPOXY-RESIN TERRAZZO INSTALLATION

- A. Comply with NTMA's written recommendations for terrazzo and accessory installation.

- B. Place, rough grind, grout, cure grout, fine grind, and finish terrazzo according to manufacturer's written instructions and NTMA's "Terrazzo Specifications and Design Guide."
- C. Installation Tolerance: Limit variation in terrazzo surface from level to 1/4 inch in 10 feet (6.4 mm in 3 m); noncumulative.
- D. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.
- E. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.
- F. Primer: Apply to terrazzo substrates according to manufacturer's written instructions.
- G. Strip Materials:
  - 1. Divider and Control-Joint Strips:
    - a. Locate divider strips in locations indicated.
  - 2. Accessory Strips: Install in locations indicated.

### 3.4 REPAIR

- A. Cut out and replace terrazzo areas that evidence lack of bond with substrate. Cut out terrazzo areas in panels defined by strips and replace to match adjacent terrazzo, or repair panels according to NTMA's written recommendations, as approved by Architect.

### 3.5 CLEANING AND PROTECTION

- A. Cleaning:
  - 1. Remove grinding dust from installation and adjacent areas.
  - 2. Wash surfaces with cleaner according to NTMA's written recommendations and manufacturer's written instructions; rinse surfaces with water and allow them to dry thoroughly.
- B. Sealing:
  - 1. Seal surfaces according to NTMA's written recommendations.
  - 2. Apply sealer according to sealer manufacturer's written instructions.
- C. Protection: Provide final protection and maintain conditions, in a manner acceptable to Installer, that ensure that terrazzo is without damage or deterioration at time of Substantial Completion.

END OF SECTION 09 66 23

SECTION 09 68 13

TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes modular carpet tile.
- B. Related Sections include the following:
  - 1. Division 09 Section "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:
    - a. Review delivery, storage, and handling procedures.
    - b. Review ambient conditions and ventilation procedures.
    - c. Review subfloor preparation procedures.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated. Include manufacturer's written data on physical characteristics, durability, and fade resistance. Include installation recommendations for each type of substrate.
- B. LEED Submittals:
  - 1. Product Data for Credit EQ 4.3:
    - a. For carpet tile, documentation indicating compliance with testing and product requirements of CRI's "Green Label Plus" program.
    - b. For installation adhesive, documentation including printed statement of VOC content.
- C. Shop Drawings: Show the following:
  - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
  - 2. Carpet tile type, color, and dye lot.
  - 3. Type of subfloor.
  - 4. Type of installation.

5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

D. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and other Accessory Stripping: 12-inch- (300-mm-) long Samples.

E. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

F. Warranty: Special warranty specified in this Section.

#### 1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile

#### 1.6 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

B. Mockups: Before installing carpet tile, build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Approved mockups may become part of the completed Work if undamaged at time of Substantial Completion.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI 104, Section 5, "Storage and Handling."

#### 1.8 PROJECT CONDITIONS

A. Comply with CRI 104, Section 7.2, "Site Conditions; Temperature and Humidity" and Section 7.12, "Ventilation."

B. Environmental Limitations: Do not install carpet tiles until wet work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

- C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

#### 1.9 WARRANTY

- A. Special Warranty for Carpet Tiles: Manufacturer's standard form in which manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.
  - 1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
  - 2. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, dimensional stability, and delamination.
  - 3. Warranty Period: 10 years from date of Substantial Completion.

#### 1.10 EXTRA MATERIALS

- A. Furnish extra materials described below, before installation begins, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

### PART 2 - PRODUCTS

#### 2.1 CARPET TILE

- A. General: 6 color/style combinations as selected from manufacturer's full range of colors and patterns. Refer to Drawings.

#### 2.2 CARPET TILE (CPT -1)

- A. Basis of Design: Mannington Commercial, "Sylvan Structures I – Infinity Re Modular."
- B. Color: Colors as selected from manufacturer's full range of colors and patterns. Refer to Drawings.
- C. Construction: "Tip Sheared Patterned Loop."
- D. Fiber Content: 100 percent nylon 6, 6.
- E. Fiber Type: "Invista Antron Legacy, hollow filament nylon, with permanent stain and bleach protection, static control, and "Duratech" soil resistant treatment, and a fiber modification ratio of <1.5.
- F. Dye Method: Solution Dyed.
- G. Stitches per Inch: 13.5
- H. Gage: 5/64.
- I. Pile thickness: 0.109 inches.

- J. Finished Yarn Weight: 23 ounces per square yard.
- K. Average Density: 7,596.
- L. Weight Density: 174,715.
- M. Recycled Content: Minimum 25% total recycled content by total product weight. Minimum 10% post-consumer recycled content by total product weight.
- N. Size: 24 by 24 inches (610 by 610 mm).
- O. Performance Characteristics: As follows:
  1. Radiant Panel Testing (ASTM E 648): Class 1.
  2. Smoke Chamber (ASTM E 662): Less than 450 (Flaming Mode).
  3. Dimensional Stability: Passes per ISO 2551 (Aachen Test).
  4. Electrostatic Propensity: Less than 3.0 kV per AATCC 134.
  5. Emissions: Provide carpet tile that complies with testing and product requirements of CRI's "Green Label Plus" program.

### 2.3 CARPET TILE (CPT -2)

- A. Basis of Design: Mannington Commercial, "Sylvan Structures II – Infinity Re Modular."
- B. Color: Colors as selected from manufacturer's full range of colors and patterns. Refer to Drawings.
- C. Construction: "Tip Sheared Patterned Loop."
- D. Fiber Content: 100 percent nylon 6, 6.
- E. Fiber Type: "Invista Antron Legacy, hollow filament nylon, with permanent stain and bleach protection, static control, and "Duratech" soil resistant treatment, and a fiber modification ratio of <1.5.
- F. Dye Method: Solution Dyed.
- G. Stitches per Inch: 13.66
- H. Gage: 5/64.
- I. Pile thickness: 0.112 inches.
- J. Finished Yarn Weight: 23 ounces per square yard.
- K. Average Density: 7,392.
- L. Weight Density: 170,035.
- M. Recycled Content: Minimum 25% total recycled content by total product weight. Minimum 10% post-consumer recycled content by total product weight.
- N. Size: 24 by 24 inches (610 by 610 mm).
- O. Performance Characteristics: As follows:
  1. Radiant Panel Testing (ASTM E 648): Class 1.
  2. Smoke Chamber (ASTM E 662): Less than 450 (Flaming Mode).
  3. Dimensional Stability: Passes per ISO 2551 (Aachen Test).

4. Electrostatic Propensity: Less than 3.0 kV per AATCC 134.
5. Emissions: Provide carpet tile that complies with testing and product requirements of CRI's "Green Label Plus" program.

#### 2.4 CARPET TILE (CPT-3)

- A. Basis of Design: Mannington Commercial, "Elemental Neutrals II – Infinity Modular."
- B. Color: Colors as selected from manufacturer's full range of colors and patterns. Refer to Drawings.
- C. Construction: "Graphic Loop."
- D. Fiber Content: 100 percent nylon 6, 6.
- E. Fiber Type: "Invista Antron Lumena, hollow filament nylon, with permanent stain and bleach protection, static control, and "Duratech" soil resistant treatment, and a fiber modification ratio of <1.5.
- F. Dye Method: Solution Dyed.
- G. Stitches per Inch: 9
- H. Gage: 1/10.
- I. Pile thickness: 0.104 inches.
- J. Finished Yarn Weight: 14 ounces per square yard.
- K. Average Density: 4,846.
- L. Weight Density: 67,846.
- M. Recycled Content: Containing post-consumer recycled content.
- N. Size: 24 by 24 inches (610 by 610 mm).
- O. Performance Characteristics: As follows:
  1. Radiant Panel Testing (ASTM E 648): Class 1.
  2. Smoke Chamber (ASTM E 662): Less than 450 (Flaming Mode).
  3. Dimensional Stability: Passes per ISO 2551 (Aachen Test).
  4. Electrostatic Propensity: Less than 3.0 kV per AATCC 134.
  5. Emissions: Provide carpet tile that complies with testing and product requirements of CRI's "Green Label Plus" program.

#### 2.5 CARPET TILE (CPT-4)

- A. Basis of Design: Mannington Commercial, "Elemental Brights II – Infinity Modular."
- B. Color: Colors as selected from manufacturer's full range of colors and patterns. Refer to Drawings.
- C. Construction: "Graphic Loop."
- D. Fiber Content: 100 percent nylon 6, 6.
- E. Fiber Type: "Invista Antron Lumena, hollow filament nylon, with permanent stain and bleach protection, static control, and "Duratech" soil resistant treatment, and a fiber modification ratio of <1.5.

- F. Dye Method: Solution Dyed.
- G. Stitches per Inch: 9
- H. Gage: 1/10.
- I. Pile thickness: 0.104 inches.
- J. Finished Yarn Weight: 14 ounces per square yard.
- K. Average Density: 4,846.
- L. Weight Density: 67,846.
- M. Recycled Content: Containing post-consumer recycled content.
- N. Size: 24 by 24 inches (610 by 610 mm).
- O. Performance Characteristics: As follows:
  1. Radiant Panel Testing (ASTM E 648): Class 1.
  2. Smoke Chamber (ASTM E 662): Less than 450 (Flaming Mode).
  3. Dimensional Stability: Passes per ISO 2551 (Aachen Test).
  4. Electrostatic Propensity: Less than 3.0 kV per AATCC 134.
  5. Emissions: Provide carpet tile that complies with testing and product requirements of CRI's "Green Label Plus" program.

## 2.6 CARPET TILE (CPT-5) (CPT-6) (CPT-7) (CPT-8)

- A. Basis of Design: Mannington Commercial, "Elemental Solids II – Infinity Modular."
- B. Color: Colors as selected from manufacturer's full range of colors and patterns. Refer to Drawings.
- C. Construction: "Graphic Loop."
- D. Fiber Content: 100 percent nylon 6, 6.
- E. Fiber Type: "Invista Antron Lumena, hollow filament nylon, with permanent stain and bleach protection, static control, and "Duratech" soil resistant treatment, and a fiber modification ratio of <1.5.
- F. Dye Method: Solution Dyed.
- G. Stitches per Inch: 9
- H. Gage: 1/10.
- I. Pile thickness: 0.104 inches.
- J. Finished Yarn Weight: 14 ounces per square yard.
- K. Average Density: 4,846.
- L. Weight Density: 67,846.
- M. Recycled Content: Containing post-consumer recycled content.
- N. Size: 24 by 24 inches (610 by 610 mm).

O. Performance Characteristics: As follows:

1. Radiant Panel Testing (ASTM E 648): Class 1.
2. Smoke Chamber (ASTM E 662): Less than 450 (Flaming Mode).
3. Dimensional Stability: Passes per ISO 2551 (Aachen Test).
4. Electrostatic Propensity: Less than 3.0 kV per AATCC 134.
5. Emissions: Provide carpet tile that complies with testing and product requirements of CRI's "Green Label Plus" program.

2.7 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.
- B. Adhesives: Water-resistant, mildew resistant, non-staining, pressure sensitive adhesive installation system to suit specified carpet tile and subfloor conditions indicated, that complies with flammability for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
- C. Stair Nosings: Johnsonite model VCD-XX, or comparable product acceptable to Architect.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Examine carpet tile for type, color, pattern, and potential defects.
- B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710 and the following:
  1. Slab substrates are dry and free of curing compounds, sealers, hardeners, and other materials that may interfere with adhesive bond. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by carpet tile manufacturer.
  2. Subfloor finishes comply with requirements specified in Division 03 Section "Cast-in-Place Concrete" for slabs receiving carpet tile.
  3. Subfloors are free of cracks, ridges, depressions, scale, and foreign deposits.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. General: Comply with CRI 104, Section 6.2, "Site Conditions; Floor Preparation," and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile installation.
- B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider and protrusions more than 1/32 inch (0.8 mm), unless more stringent requirements are required by manufacturer's written instructions.
- C. Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by carpet tile manufacturer.

- D. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

### 3.3 INSTALLATION

- A. General: Comply with CRI 104, Section 14, "Carpet Modules," and with carpet tile manufacturer's written installation instructions.
- B. Installation Method: As recommended in writing by carpet tile manufacturer.
- C. Maintain dye lot integrity. Do not mix dye lots in same area.
- D. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- E. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- G. Install pattern parallel to walls and borders.
  - 1. Install carpet tile in bedrooms in random pattern.
  - 2. Install carpet tile in offices in monolithic pattern.

### 3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet tile manufacturer.
  - 2. Remove yarns that protrude from carpet tile surface.
  - 3. Vacuum carpet tile using commercial machine with face-beater element.
- B. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 09 68 13

SECTION 09 72 00

WALL COVERINGS

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. Vinyl wall covering.

- B. Related Sections: The following Sections contain requirements that relate to this Section:

1.3 PREINSTALLATION MEETINGS

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

1.4 ACTION SUBMITTALS

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

- 1. Include data on physical characteristics, durability, fade resistance, and fire-test-response characteristics.

- B. LEED Submittals:

- 1. Certificates for Credit MR 7: Chain-of-custody certificates indicating that wood-veneer wall coverings comply with forest certification and chain-of-custody requirements. Include statement indicating cost for each certified wood product.
  - 2. Product Data for Credit IEQ 4.1: For adhesives, documentation including printed statement of VOC content.
  - 3. Product Data for Credit IEQ 4.2: For paints and coatings, documentation including printed statement of VOC content.

- C. Shop Drawings showing location and extent of each wall covering type. Indicate seams and termination points.

- D. Samples for initial selection in the form of manufacturer's color charts consisting of actual units or sections of units showing the full range of colors, textures, and patterns available.

- E. Samples for verification in sets for each color, texture, and pattern specified, showing the full range of variations expected in these characteristics.

- F. Wall Covering Material: Full-width sample, not less than 36 inches (914 mm) long, from dye lot used for the Work.

- 1. Submit sample with specified treatments applied.

- G. Product certificates signed by manufacturers of wall coverings certifying that their products comply with specified requirements.
- H. Maintenance data for wall covering to include in the operation and maintenance manual specified in Division 1.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For wall coverings to include in maintenance manuals.

#### 1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Wall-Covering Materials: For each type, color, texture, and finish, full width by length to equal to 5 percent of amount installed.

#### 1.7 QUALITY ASSURANCE

- A. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and to set quality standards for installation.
  - 1. Build mockups for each type of wall covering on each substrate required. Comply with requirements in ASTM F 1141 for appearance shading characteristics.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  - 3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install wall coverings until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at levels intended for occupants after Project completion during the remainder of the construction period.
- B. Lighting: Do not install wall covering until lighting that matches conditions intended for occupants after Project completion is provided on the surfaces to receive wall covering.
- C. Ventilation: Provide continuous ventilation during installation and for not less than the time recommended by wall-covering manufacturer for full drying or curing.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: As determined by testing identical wall coverings applied with identical adhesives to substrates according to test method indicated below by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

1. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - a. Flame-Spread Index: 25 or less.
  - b. Smoke-Developed Index: 50 or less.
2. Fire-Growth Contribution: No flashover and heat and smoke release according to NFPA 265 or NFPA 286.

## 2.2 VINYL WALL COVERING

- A. Available Products: Subject to compliance with requirements, wall coverings that may be incorporated into the Work include, but are not limited to, the following:
  1. Fabric Wallcovering: Hytex "Dimensions."
  2. Vinyl Wallcovering: Lanark "Trafalgar."

## 2.3 ACCESSORIES

- A. Adhesive: Mildew-resistant, nonstaining adhesive, for use with specific wall covering and substrate application indicated and as recommended in writing by wall-covering manufacturer.
  1. Adhesive shall have a VOC content of 50 g/L or less.
- B. Primer/Sealer: Mildew resistant, complying with requirements in Section 09 91 00 "Painting" and recommended in writing by primer/sealer and wall-covering manufacturers for intended substrate.
- C. Seam Tape: As recommended in writing by wall-covering manufacturer.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for levelness, wall plumbness, maximum moisture content, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.
- B. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.
- C. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
  1. Moisture Content: Maximum of 5 percent on new plaster, concrete, and concrete masonry units when tested with an electronic moisture meter.
  2. Plaster: Allow new plaster to cure. Neutralize areas of high alkalinity. Prime with primer recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
  3. Metals: If not factory primed, clean and apply primer recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.

4. Gypsum Board: Prime with primer as recommended in writing by primer/sealer manufacturer and wall-covering manufacturer.
  5. Painted Surfaces: Treat areas susceptible to pigment bleeding.
- D. Check painted surfaces for pigment bleeding. Sand gloss, semigloss, and eggshell finish with fine sandpaper.
  - E. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.
  - F. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.

### 3.3 WALL-COVERING INSTALLATION

- A. Comply with wall-covering manufacturers' written installation instructions applicable to products and applications indicated.
- B. Cut wall-covering strips in roll number sequence. Change the roll numbers at partition breaks and corners.
- C. Install strips in same order as cut from roll.
- D. Install wall covering without lifted or curling edges and without visible shrinkage.
- E. Match pattern 72 inches (1830 mm) above the finish floor.
- F. Trim edges and seams for color uniformity, pattern match, and tight closure. Butt seams without overlaps or gaps between strips.
- G. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.

### 3.4 CLEANING

- A. Remove excess adhesive at seams, perimeter edges, and adjacent surfaces.
- B. Use cleaning methods recommended in writing by wall-covering manufacturer.
- C. Replace strips that cannot be cleaned.
- D. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

END OF SECTION 09 72 00

SECTION 09 72 26

CUSTOM DIGITAL WALL COVERINGS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Custom pictorial image vinyl wall covering.

1.2 QUALITY ASSURANCE

- A. Imperfections such as roller die marks, roller repeat marks or other features deemed not in conformance with the specific materials, will be cause for rejection by the Architect.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Maintenance Data: For wall coverings to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 WALL COVERINGS

- A. General: Provide digital wall covering printed on vinyl substrate.
1. Thickness of vinyl shall be manufacturer's standard for interior mural installation.
  2. Mural shall be adhesive backed ready for installation.

2.2 MANUFACTURERS

- A. Companies that produce custom digital wall murals include, but are not limited to the following:
1. Fastsigns
  2. Sign-A-Rama
  3. 1<sup>st</sup> Signs
  4. Sign Depot
  5. MDC

2.3 ARTWORK

- A. Architect will furnish artwork in PDF format. If requested, a paper proof and color guide can be provided

## 2.4 ACCESSORIES

- A. Adhesive: Mildew-resistant, nonstaining, strippable adhesive, for use with specific wall covering and substrate application; as recommended in writing by wall-covering .

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Clean substrates of substances that could impair bond of wall covering, including dirt, oil, grease, mold, mildew, and incompatible primers.
- B. Prepare substrates to achieve a smooth, dry, clean, structurally sound surface free of flaking, unsound coatings, cracks, and defects.
  - 1. Painted Surfaces: Treat areas susceptible to pigment bleeding.
- C. Remove hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.
- D. Acclimatize wall-covering materials by removing them from packaging in the installation areas not less than 24 hours before installation.
- E. Overlap subsequent panels to match crop lines and double cut on the wall. Selvage (excess trimmed edge) shall be removed from the wall and the seam immediately.
- F. Install seams vertical and plumb at least 6 inches (150 mm) from outside corners and 6 inches (150 mm) from inside corners. No horizontal seams are permitted.
- G. Fully bond wall covering to substrate. Remove air bubbles, wrinkles, blisters, and other defects.
- H. Remove excess adhesive at finished seams, perimeter edges, and adjacent surfaces.
- I. Inspect image after installation. Request the inspection by the Architect if there are variations in color that may be considered to be excessive.
- J. Reinstall hardware and hardware accessories, electrical plates and covers, light fixture trims, and similar items.

### 3.2 CLEAN-UP

- A. Upon completion of the work, remove surplus materials, rubbish and debris resulting from the wall covering installation. Leave areas in neat, clean and orderly condition.

END OF SECTION 09 72 26

SECTION 09 84 33

SOUND-ABSORBING WALL UNITS

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 shop-fabricated, fabric-wrapped panel units tested for acoustical performance, including:
  - 1. Sound-absorbing wall panels.

1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.
- B. SAA: Sound Absorption Average.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of panel edge, core material, and mounting indicated.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
  - 2. Product Certificates for Credit MR 5.1: For products and materials required to comply with requirements for regionally manufactured materials. Include statement indicating cost, location of manufacturer, and distance to Project for each regionally manufactured material.
  - 3. Product Data for Credit IEQ 4.1: For installation adhesives, documentation including printed statement of VOC content and chemical components.
  - 4. Product Data for Credit IEQ 4.4: For composite wood products used in sound-absorbing wall units, documentation indicating that product contains no urea formaldehyde.
- C. Shop Drawings: For sound-absorbing wall units. Include mounting devices and details; details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge and core materials.
- D. Samples for Initial Selection: For each type of fabric facing from sound-absorbing wall unit manufacturer's full range.
- E. Samples for Verification: For the following products, prepared on Samples of size indicated below:
  - 1. Assembled Panels: Approximately 36 by 36 inches (900 by 900 mm), including joints and mounting methods.

1.5 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For sound-absorbing wall units to include in maintenance manuals. Include manufacturers' written cleaning recommendations.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Mounting Devices: Full-size units equal to 5 percent of amount installed, but no fewer than five devices, including unopened adhesives.

1.8 QUALITY ASSURANCE

- A. Source Limitations: Obtain sound-absorbing wall units from single source from single manufacturer.
- B. Fire-Test-Response Characteristics: Provide sound-absorbing wall units meeting the following as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
  - 1. Surface-Burning Characteristics: As determined by testing per ASTM E 84 for a 2 inch thick product:
    - a. Flame-Spread Index: 25 or less.
    - b. Smoke-Developed Index: 250 or less.
  - 2. Fire Growth Contribution: Meeting acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 or NFPA 286.
- C. Provide acoustical wall panels, which have been manufactured, fabricated and installed to provide Noise Reduction Coefficient (NRC) rating as follows:
  - 1. For direct adhesive or mechanical fastener mounting NRC 0.85 for 2 inch thickness.
- D. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials, fabrication, and installation.
  - 1. Build mockup of typical wall area.
  - 2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with sound-absorbing wall unit manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and units in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

## 1.10 PROJECT CONDITIONS

- A. Environmental Limitations: Do not install sound-absorbing wall units until spaces are enclosed and weathertight, wet work in spaces is complete and dry, work at and above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Verify locations of sound-absorbing wall units and actual dimensions of openings and penetrations by field measurements before fabrication.

## 1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of sound-absorbing wall units that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to the following:
    - a. Acoustical performance.
    - b. Sagging, distorting, or releasing from panel edge.
    - c. Warping of core.
  - 2. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 SOUND-ABSORBING WALL UNITS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide "Dimensional Acoustic Panel" acoustical wall panels as manufactured by Acoustic Enterprises, Inc. or comparable product acceptable to the Architect.
  - 1.
- B. Sound-Absorbing Wall Panel: Manufacturer's standard panel construction of 6 to 7 pcf fiberglass.
  - 1. Class A Fire Rating.
  - 2. Acoustical panels shall be impervious to moisture, excessive humidity or water.
  - 3. Acoustical panels shall be impact resistant.
  - 4. Thickness 2 inches (51 mm) thick.
  - 5. Color: as selected from manufacturer's standard colors.
  - 6. Pattern: 907 "Silhouettes."
  - 7. Edge: Square.
  - 8. Width: As indicated.
  - 9. Length: As indicated.
  - 10. Mounting: Provide concealed fasteners, and Bonded Acoustical Pad for complete single source installation. Back mount with manufacturer's standard mechanical fasteners, secured to substrate.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine fabricated units, substrates, areas, and conditions, for compliance with requirements, installation tolerances, and other conditions affecting performance of sound-absorbing wall units.

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

### 3.2 INSTALLATION

- A. Install sound-absorbing wall units in locations indicated with vertical surfaces and edges plumb, top edges level and in alignment with other units, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with sound-absorbing wall unit manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.
- C. Align and level pattern and grain among adjacent units.

### 3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch (1.6 mm).

### 3.4 CLEANING

- A. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION 09 84 33

## SECTION 09 91 00

### PAINTING

#### PART 1 - GENERAL

##### 1.1 RELATED DOCUMENTS

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

##### 1.2 SUMMARY

- A. Section Includes: Labor and materials for the surface preparation and the application of paint systems as indicated on Finish Schedule.
- B. Work shall include, but not necessarily be limited to:
  - 1. Surface preparation of substrates as required for acceptance of painting, including cleaning, small crack repair, patching, caulking, and making good surfaces and areas to the limits defined under MPI preparation requirements.
  - 2. Specific pre-treatments noted herein or specified in the MPI Architectural Painting Specification Manual.
  - 3. Priming (except where pre-primed with an approved primer under other Sections of work) and painting of structural steel, miscellaneous metal, ornamental metal and primed steel equipment.
  - 4. Priming and back-priming of wood materials as noted herein or specified in the MPI Architectural Painting Specification Manual.
  - 5. Painting of semi-concealed areas (e.g. behind grilles, and projecting edges above and below sight lines).
  - 6. Painting of exposed to view mechanical (heating, ventilating and plumbing) services and equipment, e.g., ducts, sprinkler piping, etc., and electrical work to extent noted on Finish Schedule unless pre-finished.
  - 7. Re-painting of existing surfaces and finishes when adjacent to new painting work where applicable including surface preparation, prime and finish coats in accordance with MPI Repainting requirements.
- C. Refer to drawings and schedules (e.g., Finish Schedule) for type, location and extent of finishes required, and include touch-ups and field painting necessary to complete work indicated, scheduled or specified.

##### 1.3 REFERENCES

- A. The latest edition of the following reference standards shall govern all painting work:
  - 1. Architectural Painting Specification Manual by the Master Painters Institute (MPI), including Identifiers, Evaluation, Systems, Preparation and Approved Product List. (hereafter referred to as the MPI Painting Manual) as issued by the local MPI Accredited Quality Assurance Association having jurisdiction.

##### 1.4 DEFINITIONS

- A. Gloss Levels:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat finish	0 to 5	10 max.
G2	Velvet finish	0 to 10	10 to 35
G3	Eggshell finish	10 to 25	10 to 35
G4	Satin finish	20 to 35	35 min.
G5	Semi-Gloss finish	35 to 70	
G6	Gloss finish	70 to 85	
G7	High-Gloss finish	> 85	

### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. LEED Submittals:
  - 1. Product Data for Credit EQ 4.2: For paints and coatings, including printed statement of VOC content.
- C. Samples for Initial Selection: For each type of topcoat product.
- D. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches (200 mm) square.
  - 2. Step coats on Samples to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.
- E. Product List: Submit a list of all painting materials to Architect for review prior to ordering materials. If requested, provide an invoice list of paint materials ordered for project work to Architect indicating manufacturer, types and quantities for verification and compliance with specification and design requirements.

### 1.6 MAINTENANCE MATERIAL SUBMITTALS

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

### 1.7 QUALITY ASSURANCE

- A. Samples: Provide duplicate minimum 300 mm (12") square samples of surfaces or acceptable facsimiles requested painted with specified paint or coating in colors, gloss / sheen and textures required to MPI Painting Manual standards for review and approval. When approved, samples shall become acceptable standard of quality for appropriate on-site surface with one of each sample retained on-site.
- B. Mock-ups: Prepare and paint designated surface, area, room or item (in each color scheme) to requirements specified herein, with specified paint or coating showing selected colors, gloss / sheen, textures and workmanship to MPI Painting Manual standards for review and approval. When approved, surface, area, room and/or items shall become minimum acceptable standard of finish quality and workmanship for similar on-site work.

1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- C. Installer shall have a minimum of five (5) years proven satisfactory experience and shall show proof before commencement of work that he will maintain a qualified crew of painters throughout the duration of the work. When requested, Contractor shall provide a list of the last three comparable jobs including, name and location, specifying authority / project manager, start / completion dates and value of the painting work.
- D. Materials, preparation and workmanship shall conform to requirements of the latest edition of the Architectural Painting Specification Manual by the Master Painters Institute (MPI) (hereafter referred to as the MPI Painting Manual) as issued by the local MPI Accredited Quality Assurance Association having jurisdiction.
- E. Paint manufacturers and products used shall be as listed under the Approved Product List section of the MPI Painting Manual.
- F. Conform to requirements of local authorities having jurisdiction in regard to the storage, mixing, application and disposal of all paint and related waste materials.
- G. The painting contractor shall receive written confirmation of the specific surface preparation procedures and primers used for fabricated steel items from the fabricator / supplier to ascertain appropriate and manufacturer compatible finish coat materials to be used before painting any such work.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).
1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.
- B. Deliver painting materials in sealed, original labeled containers bearing manufacturer's name, brand name, type of paint or coating and color designation, standard compliance, materials content as well as mixing and/or reducing and application requirements.
- C. Store paint materials in original labeled containers in a secure (lockable), dry, heated and well ventilated single designated area meeting the minimum requirements of both paint manufacturer and authorities having jurisdiction and at a minimum ambient temperature of 45 deg. F. Only material used on this project shall be stored on site.

#### 1.9 FIELD CONDITIONS

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).
- B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.
1. Do not perform exterior painting work unless environmental conditions are within MPI and paint manufacturer's requirements or until adequate weather protection is provided.
  2. Do not perform painting when the relative humidity is above 85%.
  3. Do not perform painting when the maximum moisture content of the substrate exceeds:

- a. 12 % for concrete and masonry (clay and concrete block).
  - b. 15% for wood.
  - c. 12 % for plaster and gypsum board.
- 4. Conduct moisture tests using a properly calibrated electronic Moisture Meter, except test concrete floors for moisture using a simple cover patch test.
  - 5. Concrete and masonry surfaces shall be installed at least 28 days prior to painting and shall be visually dry on both sides.
- C. Schedule painting operations to prevent disruption of and by other trades.
  - D. Schedule painting operations in occupied facilities to prevent disruption of occupants in and about the building. Painting shall be carried out after facility working hours in accordance with Owner's operating requirements. Schedule work such that painted surfaces will have dried before occupants are affected. Obtain written authorization from Architect and Owner for changes in work schedule.
  - E. Apply paint only to dry, clean, properly cured and adequately prepared surfaces in areas where dust is no longer generated by construction activities such that airborne particles will not affect the quality of finished surfaces.

#### 1.10 GUARANTEE

- A. Furnish either the local MPI Accredited Quality Assurance Association's two (2) year guarantee, or, alternatively, a 100% two (2) year Maintenance Bond - both in accordance with MPI Painting Manual requirements. The Maintenance Bond shall warrant that painting work has been performed in accordance with MPI Painting Manual requirements.

### PART 2 - PRODUCTS

#### 2.1 PAINT, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
  - 1. At interior, use MPI listed materials having an E2 or E3 rating.
- B. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- D. Colors: Match Architect's sample.
- E. Only materials (primers, paints, coatings, varnishes, stains, lacquers, fillers, etc.) listed in the latest edition of the MPI Approved Product List (APL) are acceptable for use on this project.
  - 1. Other materials such as linseed oil, shellac, thinners, solvents, etc. shall be the highest quality product of an MPI listed manufacturer and shall be compatible with paint materials being used as required.

## 2.2 MIXING AND TINTING

- A. Paint shall be ready-mixed and pre-tinted. Re-mix paint in containers prior to and during application to ensure break-up of lumps, complete dispersion of settled pigment, and color and gloss uniformity.
- B. Where thinner is used, addition shall not exceed paint manufacturer's recommendations. Do not use kerosene or any such organic solvents to thin water-based paints.
- C. If required, thin paint for spraying according in strict accordance with paint manufacturer's instructions. If directions are not on container, obtain instructions in writing from manufacturer and provide copy of instructions to Architect.

## 2.3 FINISH AND COLORS

- A. Painting shall be in accordance with MPI Premium Grade finish requirements, except for MPI paint systems specified herein that are not premium grade systems (primer and topcoat).
- B. Colors shall match colors selected by Architect and, where indicated, existing building colors.
  - 1. Architect will be the sole judge of acceptable color match.
- C. Plywood service panels (e.g. electrical, telephone and cable vision panels) including edges shall be back-primed and painted to match painted wall mounted on.
- D. The inside of duct work behind louvers, grills and diffusers for a minimum of 460 mm (18") or beyond sight line, whichever is greater, shall be painted using flat black (non-reflecting) paint.

## 2.4 SOURCE QUALITY CONTROL

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- B. Exterior Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.

D. Proceed with coating application only after unsatisfactory conditions have been corrected.

1. Application of coating indicates acceptance of surfaces and conditions.

### 3.2 PREPARATION

A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

G. Wood Substrates:

1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.

2. Sand surfaces that will be exposed to view, and dust off.

3. Prime edges, ends, faces, undersides, and backsides of wood.

4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

### 3.3 APPLICATION

A. Apply paints with rollers and according to manufacturer's written instructions and recommendations in "MPI Manual." Paint in the interior of ductwork may be sprayed (Contractor's option) Paint on fibrous and acoustical substrates shall be sprayed.

1. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.

2. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.

3. Paint entire exposed surface of window frames and sashes.

4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

- B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
  - 1. Paint the following work where exposed to view:
    - a. Equipment, including panelboards.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.
    - g. Tanks that do not have factory-applied final finishes.

#### 3.4 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

#### 3.5 CLEANING AND PROTECTION

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

#### 3.6 EXTERIOR PAINTING SCHEDULE

- A. General: Provide the following paint systems for the substrates indicated: Master Painters Institute (MPI) approved products list can be found on-line at [www.paintinfo.com](http://www.paintinfo.com). Products are listed numerically, alphabetically and by category on that web site.
- B. Ferrous Metal: Handrails (Do not paint factory or shop painted handrails).

1. Latex System, Gloss Finish, MPI system EXT 5.1M.
  - a. Prime Coat: Rust Inhibitive Primer, MPI #107.
  - b. Intermediate Coat: Water Based Light Industrial Coating, MPI #164.
  - c. Topcoat: Water Based Light Industrial Coating (Gloss Level 6), MPI #164.
- C. Ferrous Metal: Architectural steel and miscellaneous ferrous metals exposed to view.
  1. Latex System, Semi-Gloss Finish, MPI system EXT 5.1M.
    - a. Prime Coat: Rust Inhibitive Primer, MPI #107 or shop primer specified in Section 05 12 13 "Architecturally Exposed Steel Framing."
    - b. Intermediate Coat: Water Based Light Industrial Coating, MPI #163.
    - c. Topcoat: Water Based Light Industrial Coating (Gloss Level 5), MPI #163.
- D. Concrete Masonry Units at Exterior: Latex over block filler, MPI system EXT 4.2A.
  - a. Prime Coat: Latex Block Filler, MPI #4.
  - b. Intermediate Coat: Latex flat paint, (Gloss Level 1) MPI #10.
  - c. Topcoat: Latex flat paint, (Gloss Level 1) MPI #10.

### 3.7 INTERIOR PAINTING SCHEDULE

- A. General: Provide the following paint systems for the substrates indicated: Master Painters Institute (MPI) approved products list can be found on-line at [www.paintinfo.com](http://www.paintinfo.com). Products are listed numerically, alphabetically and by category on that web site.
- B. Galvanized-Metal Substrates: Electrical conduits, interior sheet metal.
  1. Latex over Waterborne Primer System, select topcoat to match gloss of adjacent surfaces, MPI system INT 5.3J.
    - a. Prime Coat: Primer, galvanized, water based, MPI #134.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior, flat, (Gloss Level 1), MPI #53.
    - d. Topcoat: Latex, interior, (Gloss Level 2), MPI #44 or (Gloss Level 3), MPI #52 or (Gloss Level 4), MPI #43 or (Gloss Level 5), MPI #54.
- C. Galvanized-Metal Substrates: Duct interiors behind louvers, grills and diffusers for a minimum of 460 mm (18") or beyond sight line, whichever is greater, shall be painted using flat black (non-reflecting) paint
  1. Latex over Waterborne Primer System: Flat (not a premium grade system).
    - a. Prime Coat: Primer, galvanized, water based, MPI #134.
    - b. Topcoat: Latex, interior, flat, (Gloss Level 1), MPI #53.
- D. Ferrous Metal: Doors and door frames and other miscellaneous interior ferrous metal (Do not paint factory or shop painted doors and door frames).
  1. High-Performance Architectural Latex System: Semi-gloss, MPI system INT 5.1R.
    - a. Prime Coat: Primer, alkyd, quick dry, for metal, MPI #76.
    - b. Intermediate Coat: Latex, interior, high performance architectural, matching topcoat.
    - c. Topcoat: Latex, interior, high performance architectural, (Gloss Level 4), MPI #140.

- E. Wood Substrates: Including wood-based panel products and other wood exposed to view.
  - 1. Latex System: Eggshell, MPI system INT 6.2D.
    - a. Prime Coat: Primer, latex, for interior wood, MPI #39.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior, (Gloss Level 3), MPI #52.
  
- F. Gypsum Board Substrates:
  - 1. Latex System for Gypsum Board Ceilings: Flat, MPI system INT 9.2A.
    - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior, flat (Gloss Level 1), MPI #53.
  
  - 2. Latex System: Egg-shell, MPI system INT 9.2A.
    - a. Prime Coat: Primer sealer, latex, interior, MPI #50.
    - b. Intermediate Coat: Latex, interior, matching topcoat.
    - c. Topcoat: Latex, interior, eggshell, (Gloss Level 3), MPI #52.
  
- G. Concrete Masonry Unit Substrate at Interior (Where indicated): Institutional Low Odor/VOC, Semi-gloss, MPI system INT 4.2G.
  - a. Prime Coat: Epoxy Block Filler, MPI #116.
  - b. Intermediate Coat: Epoxy paint, (Gloss Level 6) MPI #77.
  - c. Topcoat: Epoxy paint, (Gloss Level 6) MPI #77.

END OF SECTION 09 91 00

ASI No. 4  
SECTION 10 11 16  
MARKERBOARDS

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. Glass markerboards.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, finishes, and accessories for markerboards.
- B. Samples for Initial Selection: For each type of visual display unit indicated, for units with factory-applied color finishes, and as follows:
  - 1. Samples of facings for each visual display panel type, indicating color and texture.
  - 2. Include accessory Samples to verify color selected.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranties: For special warranties.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For markerboards to include in maintenance manuals.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver factory-fabricated markerboards completely assembled in one piece.

1.7 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install markerboards until spaces are enclosed and weathertight, painting in spaces is complete and dry, work above ceilings is complete, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace markerboards that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Surfaces lose original writing and erasing qualities.
  - 2. Warranty Period: 25 years (minimum).

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of visual display unit from single source from single manufacturer.

2.2 GLASS MARKERBOARDS

- A. Basis of Design: Design is based on "GlassWrite Markerboard," as manufactured by Egan Visul, Inc. Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
  - 1. Claridge Products and Equipment, Inc.
  - 2. Egan Visual Inc.
  - 3. Fullbright Glass Boards.
- B. Glass Markerboards: 6-mm tempered glass markerboard, with smooth polished edge and eased corners.
  - 1. Width: As indicated on Drawings.
  - 2. Height: As indicated on Drawings.
- C. Mounting: Round, stainless-steel standoffs, holding glass approximately 1 inch (25 mm) from wall surface; mounted in notches in standoffs at top and bottom edges of markerboard.
- D. Color and Surface: Translucent.
- E. Marker tray: Manufacturer's standard.
  - 1. Size: As indicated, but not less than 24 inches long.
  - 2. Box Type: Extruded aluminum with slanted front, grooved tray, and aluminum end closures.
  - 3. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

PART 3 - EXECUTION

3.1 EXAMINATION

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

MARKERBOARDS

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4/28/15

3.2 PREPARATION

- A. Comply with manufacturer's written instructions for surface preparation.

3.3 INSTALLATION

- A. General: Install markerboards in locations and at mounting heights indicated on Drawings. Keep perimeter lines straight, level, and plumb. Provide accessories necessary for complete installation.

3.4 CLEANING AND PROTECTION

- A. Clean markerboards according to manufacturer's written instructions. Attach one removable cleaning instructions label to visual display unit in each room.
- B. Touch up factory-applied finishes to restore damaged or soiled areas.
- C. Cover and protect markerboards after installation and cleaning.

END OF SECTION 10 11 16

SECTION 10 14 00

SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Acrylic plaques.
  - 2. Signage accessories.
- B. Related Sections include the following:
  - 1. Division 01 Section "Temporary Facilities and Controls" for temporary project identification signs.

1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of sign.
- B. Shop Drawings: Include plans, elevations, and large-scale sections of typical members and other components. Show mounting methods, grounds, mounting heights, layout, spacing, reinforcement, accessories, and installation details.
  - 1. Provide message list for each sign, including large-scale details of wording, lettering, artwork, and braille layout.
- C. Samples for Initial Selection: For each type of sign material indicated that involves color selection.
- D. Samples for Verification: For each type of sign, include the following Samples to verify color selected:
  - 1. Dimensional Characters: Full-size Samples of each type of dimensional character (letter and number) required. Show character style, material, finish, and method of attachment.
  - 2. Casting: Show representative texture, character style, spacing, finish, and method of attachment.
  - 3. Approved samples will be returned for installation into Project.
- E. Qualification Data: For Installer.
- F. Maintenance Data: For signage cleaning and maintenance requirements to include in maintenance manuals.

1.4 QUALITY ASSURANCE

- A. Source Limitations: Obtain each sign type through one source from a single manufacturer.

- B. Regulatory Requirements: Comply with the Americans with Disabilities Act (ADA) and with code provisions as adopted by authorities having jurisdiction.

#### 1.5 PROJECT CONDITIONS

- A. Field Measurements: Where sizes of signs are determined by dimensions of surfaces on which they are installed, verify dimensions by field measurement before fabrication and indicate measurements on Shop Drawings.

#### 1.6 COORDINATION

- A. For signs supported by or anchored to permanent construction, advise installers of anchorage devices about specific requirements for placement of anchorage devices and similar items to be used for attaching signs.
  - 1. For signs supported by or anchored to permanent construction, furnish templates for installation of anchorage devices.

### PART 2 - PRODUCTS

#### 2.1 INTERIOR SIGN

- A. Signs: Fabricate from ½ inch thick Acrylic "Lightblocks" as manufactured by MB Wellington Studio with 1/8 inch opaque backer single color single sided with letters and symbols laser cut into acrylic.

#### 2.2 ACCESSORIES

- A. Mounting Methods: Use concealed fasteners fabricated from materials that are not corrosive to sign material and mounting surface.

#### 2.3 FINISHES, GENERAL

- A. Protect mechanical finishes on exposed surfaces from damage by applying strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of other components are acceptable if they are within range of approved Samples and are assembled or installed to minimize contrast.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

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

3.2 INSTALLATION

- A. General: Locate signs and accessories where indicated, using mounting methods of types described and in compliance with manufacturer's written instructions.
  - 1. Install signs level, plumb, and at heights indicated, with sign surfaces free from distortion and other defects in appearance.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 10 14 00

SECTION 10 14 19

DIMENSIONAL CHARACTER SIGNAGE

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. Dimensional characters.
- B. Related Sections include the following:
  - 1. Division 01 Section "Temporary Facilities and Controls" for temporary Project identification signs and for temporary information and directional signs.
  - 2. Division 10 Section "Signage" for interior signs.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Samples for Verification: For each of the following products and for the full range of color, texture, and sign material indicated, of sizes indicated:
  - 1. Dimensional Characters: Full-size Samples of each type of dimensional character (letter, number, and graphic element).
- C. Maintenance Data: For signs to include in maintenance manuals.
- D. Warranty: Special warranty specified in this Section.

1.4 QUALITY ASSURANCE

- A. Source Limitations for Signs: Obtain each sign type indicated from one source from a single manufacturer.

1.5 PROJECT CONDITIONS

- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit installation of signs in exterior locations to be performed according to manufacturers' written instructions and warranty requirements.
- B. Field Measurements: Verify recess openings by field measurements before fabrication and indicate measurements on Shop Drawings.

1.6 COORDINATION

- A. Coordinate placement of anchorage devices with templates for installing signs.

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of metal finishes beyond normal weathering.
  - 2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum Castings: ASTM B 26/B 26M, of alloy and temper recommended by sign manufacturer for casting process used and for use and finish indicated.

2.2 DIMENSIONAL CHARACTERS

- 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. ACE Sign Systems, Inc.
  - 2. Advance Corporation; Braille-Tac Division.
  - 3. A. R. K. Ramos.
  - 4. ASI-Modulex, Inc.
  - 5. Bunting Graphics, Inc.
  - 6. Charleston Industries, Inc.
  - 7. Gemini Incorporated.
  - 8. Grimco, Inc.
  - 9. Innerface Sign Systems, Inc.
  - 10. Metal Arts; Div. of L&H Mfg. Co.
  - 11. Mills Manufacturing Company.
  - 12. Mohawk Sign Systems.
  - 13. Nelson-Harkins Industries.
  - 14. Signature Signs, Incorporated.
  - 15. Southwell Company (The).
- B. Characters: Cast or extrude characters with smooth flat faces, sharp corners, and precisely formed lines and profiles, free of pits, scale, sand holes, and other defects. Provide lugs into back of characters and tap to receive threaded mounting studs. Alloy and temper recommended by sign manufacturer for process used and for use and finish indicated. Comply with the following requirements.
  - 1. Character Material: Aluminum.
  - 2. Thickness: Manufacturer's Standard for 8 inch high numbers.
  - 3. Color(s): Medium bronze anodized. .
  - 4. Mounting: Concealed studs, noncorroding for substrates encountered.

## 2.3 ACCESSORIES

- A. Anchors and Inserts: Provide nonferrous-metal or hot-dip galvanized anchors and inserts for exterior installations and elsewhere as required for corrosion resistance. Use toothed steel or lead expansion-bolt devices for drilled-in-place anchors. Furnish inserts, as required, to be set into concrete or masonry work.

## 2.4 FINISHES, GENERAL

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

## 2.5 ALUMINUM FINISHES

- A. Color Anodic Finish: Manufacturer's standard Class 1 integrally colored or electrolytically deposited color anodic coating, 0.018 mm or thicker, in applied over a satin (directionally textured) mechanical finish, complying with AAMA 611.
  - 1. Color: As selected by Architect from manufacturer's full range.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Verify that items, including anchor inserts, are sized and located to accommodate signs.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Locate characters and accessories where indicated, using mounting methods of types described and complying with manufacturer's written instructions.
  - 1. Install characters level, plumb, and at heights indicated, with sign surfaces free of distortion and other defects in appearance.
- B. Dimensional Characters: Mount characters using standard fastening methods to comply with manufacturer's written instructions for character form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish character spacing and to locate holes for fasteners.
  - 1. Projected Mounting: Mount characters at projection distance from wall surface indicated.

3.3 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to manufacturer's written instructions. Protect signs from damage until acceptance by Owner.

END OF SECTION 10 14 19

## SECTION 10 21 13

### TOILET COMPARTMENTS

#### 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. Stainless-steel toilet compartments configured as toilet enclosures and urinal screens.

###### B. Related Sections:

- 1. Division 06 Section "Miscellaneous Rough Carpentry" for blocking.
- 2. Division 10 Section "Toilet and Bath" for toilet tissue dispensers, grab bars, and similar accessories.

##### 1.3 SUBMITTALS

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

###### B. LEED Submittals:

- 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.

- C. Shop Drawings: For toilet compartments. Include plans, elevations, sections, details, and attachments to other work.

- 1. Show locations of cutouts for compartment-mounted toilet accessories.
- 2. Show locations of reinforcements for compartment-mounted grab bars.
- 3. Show locations of centerlines of toilet fixtures.

- D. Samples for Initial Selection: For each type of unit indicated. Include Samples of hardware and accessories involving material and color selection.

- E. Maintenance Data: For toilet compartments to include in maintenance manuals.

##### 1.4 QUALITY ASSURANCE

- A. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84, or another standard acceptable to authorities having jurisdiction, by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

- 1. Flame-Spread Index: 25 or less.

2. Smoke-Developed Index: 450 or less.

- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA) and Architectural Barriers Act (ABA) Accessibility Guidelines for Buildings and Facilities" and ICC/ANSI A117.1 for toilet compartments designated as accessible.

#### 1.5 PROJECT CONDITIONS

- A. Field Measurements: Verify actual locations of toilet fixtures, walls, columns, ceilings, and other construction contiguous with toilet compartments by field measurements before fabrication.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS

- A. Recycled Content of Metal Components: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 25 percent.
- B. Stainless-Steel Castings: ASTM A 743/A 743M.
- C. Steel Sheet: Commercial steel sheet for exposed applications; mill phosphatized and selected for smoothness.
- D. Zamac: ASTM B 86, commercial zinc-alloy die castings.

#### 2.2 STEEL UNITS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Global Glo-Gard powder coated-head braced standard metal toilet partitions or comparable product by one of the following:
1. Global Glo-Gard
  2. All American Metal Corp.
  3. Bradley Corporation; Mills Partitions.
  4. Hadrian Manufacturing Inc.
- B. Toilet-Enclosure Style: Ceiling hung.
- C. Urinal-Screen Construction:
1. Flat-Panel Urinal Screen: Matching panel construction.
- D. Door, Panel, and Pilaster Construction: Seamless, metal facing sheets pressure laminated to core material; with continuous, interlocking molding strip or lapped-and-formed edge closures; corners secured by welding or clips and exposed welds ground smooth. Exposed surfaces shall be free of pitting, seam marks, roller marks, stains, discolorations, telegraphing of core material, or other imperfections.
1. Core Material: Manufacturer's standard sound-deadening honeycomb of resin-impregnated kraft paper in thickness required to provide finished thickness of 1 inch(25 mm) for doors and panels and 1-1/4 inches(32 mm) for pilasters.
  2. Grab-Bar Reinforcement: Provide concealed internal reinforcement for grab bars mounted on units.
  3. Tapping Reinforcement: Provide concealed reinforcement for tapping (threading) at locations where machine screws are used for attaching items to units.

- E. Urinal-Screen Construction:
  - 1. Flat-Panel Urinal Screen: Matching panel construction.
- F. Facing Sheets and Closures: Zinc coated galvaneal steel sheet with nominal base-metal (uncoated) thicknesses as follows:
  - 1. Panels: 0.036 inch (0.9 mm).
  - 2. Doors: Manufacturer's standard thickness, but not less than 0.030 inch (0.76 mm).
  - 3. Flat-Panel Urinal Screens: Thickness matching the panels.
- G. Brackets (Fittings):
  - 1. Stirrup Type: Ear or U-brackets; chrome-plated zamac.
- H. Steel-Sheet Finish: Immediately after cleaning and pretreating, apply manufacturer's standard powder coat finish. Comply with coating manufacturer's written instructions for applying and baking.
  - 1. Color: As selected by Architect from manufacturer's full range.

### 2.3 ACCESSORIES

- A. Hardware and Accessories: Manufacturer's standard design, heavy-duty operating hardware and accessories.
  - 1. Material: Stainless steel.
  - 2. Hinges: Manufacturer's standard continuous, piano type that swings to a closed or partially open position.
  - 3. Latch and Keeper: Manufacturer's standard surface-mounted latch unit designed for emergency access and with combination rubber-faced door strike and keeper. Provide units that comply with regulatory requirements for accessibility at compartments designated as accessible.
  - 4. Coat Hook: Manufacturer's standard combination hook and rubber-tipped bumper, sized to prevent in-swinging door from hitting compartment-mounted accessories. Do not locate on toilet compartment door.
  - 5. Door Bumper: Manufacturer's standard rubber-tipped bumper at out-swinging doors.
  - 6. Door Pull: Manufacturer's standard unit at out-swinging doors that complies with regulatory requirements for accessibility. Provide units on both sides of doors at compartments designated as accessible.
- B. Anchorages and Fasteners: Manufacturer's standard exposed fasteners of stainless steel or chrome-plated steel or brass, finished to match the items they are securing, with theft-resistant-type heads. Provide sex-type bolts for through-bolt applications. For concealed anchors, use stainless steel, hot-dip galvanized steel, or other rust-resistant, protective-coated steel.

### 2.4 FABRICATION

- A. Fabrication, General: Fabricate toilet compartment components to sizes indicated. Coordinate requirements and provide cutouts for through-partition toilet accessories and solid blocking within panel where required for attachment of toilet accessories.
- B. Ceiling-Hung Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment nuts at pilasters for connection to structural support above finished ceiling. Provide assemblies that support pilasters from structure without transmitting load to finished ceiling. Provide sleeves (caps) at tops of pilasters to conceal anchorage.

- C. Door Size and Swings: Unless otherwise indicated, provide 24-inch- (610-mm-) wide, in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide, out-swinging doors with a minimum 32-inch- (813-mm-) wide, clear opening for compartments designated as accessible.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.
  - 1. Maximum Clearances:
    - a. Pilasters and Panels: 1/2 inch (13 mm).
    - b. Panels and Walls: 1 inch (25 mm).
- B. Ceiling-Hung Units: Secure pilasters to supporting structure and level, plumb, and tighten. Hang doors and adjust so bottoms of doors are level with bottoms of pilasters when doors are in closed position.

### 3.2 ADJUSTING

- A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 30 degrees from closed position when unlatched. Set hinges on out-swinging doors to return doors to fully closed position.

END OF SECTION 10 21 13

## SECTION 10 22 39

### OPERABLE PANEL PARTITIONS

#### 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. Manually operated, individual acoustical panel partitions.

##### 1.3 DEFINITIONS

- A. NIC: Noise Isolation Class.
- B. NRC: Noise Reduction Coefficient.
- C. STC: Sound Transmission Class.

##### 1.4 PREINSTALLATION MEETINGS

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

##### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For operable panel partitions.
  - 1. Include plans, elevations, sections, details, and attachments to other work.
  - 2. Indicate stacking and operating clearances. Indicate location and installation requirements for hardware and track, blocking, and direction of travel.
  - 3. Provide complete shop drawings for doors to partition pocket prior to fabrication indicating construction and installation details.
- C. Samples for Initial Selection: For each type of exposed material, finish, covering, or facing.
  - 1. Include Samples of accessories involving color selection.
- D. Samples for Verification: For each type of exposed material, finish, covering, or facing, prepared on Samples of size indicated below:
  - 1. Finish Face Fabric: Full-width sample, not less than 36 inches long, with specified treatments applied. Show complete pattern repeat.
  - 2. Panel Edge Material: Not less than 3 inches (75 mm) long.

## 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For operable panel partitions to include in maintenance manuals.
  - 1. In addition to items specified in Section 01 78 23 "Operation and Maintenance Data," include the following:
    - a. Panel finish facings and finishes for exposed trim and accessories. Include precautions for cleaning materials and methods that could be detrimental to finishes and performance.
    - b. Seals, hardware, track, track switches, carriers, and other operating components.

## 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same production run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Panel Finish-Facing Material: Furnish full width in quantity to cover both sides of two panels when installed.

## 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Operable wall manufacturer shall furnish and install pocket doors and provide labor, materials, tools, equipment, and services for pocket doors in accordance with provisions of contract documents.
- C. Preparation of the partition pocket opening shall conform to the criteria set forth per ASTM E557 Standard Practice for Architectural Application and Installation of Operable Partitions

## 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protectively package and sequence panels in order for installation. Clearly mark packages and panels with numbering system used on Shop Drawings. Do not use permanent markings on panels.
- B. Store and protect doors for partition pocket during and after installation.

## 1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of operable panel partitions that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Faulty operation of operable panel partitions.
    - b. Deterioration of metals, metal finishes, and other materials beyond normal use.
  - 2. Warranty Period: Two years from date of Substantial Completion.
- B. Doors for partition pocket doors shall be guaranteed for two years against defects in material or workmanship.

## PART 2 - PRODUCTS

### 2.1 OPERABLE ACOUSTICAL PANELS

- A. Operable Acoustical Panels: Partition system, including panels, seals, finish facing, suspension system, operators, and accessories.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide "Acousti-Seal Encore – Single Panel" as manufactured by Modernfold, Inc.; a DORMA Group Company or comparable product by one of the following:
    - a. Hufcor Inc.
    - b. Modernfold, Inc.
    - c. Panelfold Inc.
- B. Panel Operation: Manually operated, individual panels.
- C. Panel Construction: As required to support panel from suspension components and with reinforcement for hardware attachment. Fabricate panels with tight hairline joints and concealed fasteners. Fabricate panels so finished in-place partition is rigid; level; plumb; aligned, with tight joints and uniform appearance; and free of bow, warp, twist, deformation, and surface and finish irregularities.
- D. Dimensions: Fabricate operable acoustical panel partitions to form an assembled system of dimensions indicated and verified by field measurements.
  - 1. Panel Width: As indicated, but not greater than 5 ft.
- E. STC: Not less than 52.
- F. Panel Thickness: Not less than 4-1/4 inches (108 mm).
- G. Panel Construction: Top reinforcing as required to support suspension components and as follows:
  - 1. Steel Frame: Panel skins shall be 1/2 inch single material or composite layers continuously bonded to frame. Panel frame shall provide concealed steel edge protection of the skin material so as not to require exposed edge trim
- H. Panel Closure: Manufacturer's standard unless otherwise indicated.
- I. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.

### 2.2 PANEL FINISH FACINGS

- A. General: Provide finish facings for panels that comply with indicated fire-test-response characteristics and that are factory applied to operable panel partitions with appropriate backing, using mildew-resistant nonstaining adhesive as recommended by facing manufacturer's written instructions.
- B. Fabric Wall Covering: Manufacturer's standard fabric, from same dye lot, treated to resist stains.
  - 1. Color/Pattern: Custom color to match Architect's samples.

### 2.3 SUSPENSION SYSTEMS

- A. System: Manufacturer's recommended suspension system (Moderfold No. 17 suspension system).

- B. Tracks: Carriers: Steel trolley system as required for type, size, and weight of partition for ease of operation.
- C. Suspension Tracks: Steel or aluminum with overhead supports of adjustable steel hanger rods designed for size and type of operable panel partition assembly indicated. Track deflection shall be no more than 0.10 inch between bracket supports.
- D. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels.

## 2.4 SEALS

- A. Vertical Seals: Deep nesting, interlocking astragals mounted on each edge of panel. Rigid plastic astragals are not acceptable.
- B. Horizontal Top Seals: Continuous-contact extruded vinyl exerting consistent pressure on track when extended.
- C. Top rail shall incorporate shock absorbing leveler beam.
- D. Horizontal Bottom Seals: Retractable seal exerting positive pressure downward ensuring horizontal and vertical sealing and resisting panel movement.
  - 1. Extension/retraction of bottom seal automatically actuated by movement of partition. Provide 4" nominal operating clearance, and seals shall exert 97 lbs. downward force when fully extended.

## 2.5 ACCESSORIES

- A. Pass Doors: Provide pass doors at locations and sized as indicated. Doors shall be manufactured of the same material and thickness as partition panels and must maintain the same acoustical ratings as the overall partition.
- B. Bottom Seals: Provide mechanically-operated, compression type seals to provide airtight closure at the floor and steps, as applicable.
- C. Operating Hardware: Provide fully concealed hydraulic door closers at every pass door. Provide a magnetic latch with "PUSH" plate on one side and flush hand pull on the other side. Provide each door with two pair of manufacturer's standard concealed or semi-concealed design hinges.
- D. Signage: Provide one luminescent radioactive exit sign at each pass door centered above the door on the side of the panel opposite the direction of door swing.
- E. Accessibility Standard: Fabricate doors to comply with applicable provisions in ICC A117.1 and the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities.
- F. Marker Board: Manufacturer's standard 4 ft. by 4 ft. marker board with erasers.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine flooring, structural support, and opening, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of operable panel partitions.

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

### 3.2 INSTALLATION

- A. General: Comply with ASTM E 557 except as otherwise required by operable panel partition manufacturer's written installation instructions.
- B. Install operable panel partitions and accessories after other finishing operations, including painting, have been completed in area of partition installation.
- C. Install panels from marked packages in numbered sequence indicated on Shop Drawings.
- D. Broken, cracked, chipped, deformed, or unmatched panels are not acceptable.
- E. Broken, cracked, deformed, or unmatched gasketing or gasketing with gaps at butted ends is not acceptable.
- F. Doors for the partition pocket shall be installed by an authorized factory-trained installer and be in strict accordance with the approved shop drawings and manufacturer's standard printed specifications, instructions, and recommendations.

### 3.3 ADJUSTING

- A. Adjust operable panel partitions, hardware, and other moving parts to function smoothly, and lubricate as recommended by manufacturer.
- B. Adjust pass doors to operate smoothly and easily, without binding or warping.
- C. Verify that safety devices are properly functioning.

### 3.4 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain operable panel partitions.

END OF SECTION 10 22 39

## SECTION 10 26 00

### WALL AND DOOR PROTECTION

#### PART 1 - GENERAL

##### 1.1 SUMMARY

- A. Section Includes:
  - 1. Stainless Steel Corner guards.

##### 1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For each wall protection unit. Include sections, details, and attachments to other work.
- C. Samples: For each exposed product and for each color and texture specified, 12 inches (300 mm) long.
- D. Maintenance data.
- E. Warranty: Sample of special warranty.

##### 1.3 QUALITY ASSURANCE

- A. Installer Qualifications: An employer of workers trained and approved by manufacturer.
- B. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC/ANSI A117.1.

##### 1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components wall protection units that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures.
  - 2. Warranty Period: Five years from date of Substantial Completion.

#### PART 2 - PRODUCTS

##### 2.1 MATERIALS

- A. Stainless-Steel Sheet: ASTM A 240/A 240M.
- B. Fasteners: Nonmagnetic stainless-steel screws, bolts, and other fasteners compatible with items being fastened. Use flush security-type fasteners where exposed to view.

- C. Adhesive: As recommended by wall protection manufacturer and with a VOC content of 70 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

## 2.2 CORNER GUARDS

- A. Surface-Mounted, Stainless Steel Corner Guards: Fabricated from one-piece, formed or extruded metal with formed edges; with 90-degree turn to match wall condition.
  - 1. Material: Stainless steel, Type 304.
    - a. Thickness: Minimum 0.0625 inch (1.6 mm) minimum.
    - b. Finish: Directional satin, No. 4.
  - 2. Wing Size: Nominal 2 by 2 inches.
  - 3. Corner Radius: 1/8 inch (3 mm).
  - 4. Mounting: Adhesive and screws.

## 2.3 METAL FINISHES

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
  - 1. Remove tool and die marks and stretch lines, or blend into finish.
  - 2. Grind and polish surfaces to produce uniform finish, free of cross scratches.
  - 3. Run grain of directional finishes with long dimension of each piece.
  - 4. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
- B. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of work.
- B. Examine walls to which corner guards will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing corner guard components.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

### 3.3 INSTALLATION

- A. General: Install wall protection units level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.

1. Install wall protection units in locations and at mounting heights indicated on Drawings.
  2. Provide mounting hardware, anchors, and other accessories required for a complete installation.
    - a. Provide anchoring devices to withstand imposed loads.
- B. Immediately after completion of installation, clean plastic covers and accessories using a standard, ammonia-based, household cleaning agent.
- C. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION 10 26 00

SECTION 10 28 00

TOILET AND BATH ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

- 1. Toilet and bath accessories.
- 2. Custodial accessories.

B. Related Sections:

- 1. Section 08 83 00 "Mirrors" for frameless mirrors.
- 2. Section 10 21 13 "Toilet Compartments" for compartments and screens..

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product indicated. Include the following:

- 1. Construction details and dimensions.
- 2. Anchoring and mounting requirements, including requirements for cutouts in other work and substrate preparation.
- 3. Material and finish descriptions.
- 4. Features that will be included for Project.
- 5. Manufacturer's warranty.

B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.

- 1. Identify locations using room designations indicated.
- 2. Identify products using designations indicated.

1.4 INFORMATIONAL SUBMITTALS

- A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For toilet and bath accessories to include in maintenance manuals.

## 1.6 QUALITY ASSURANCE

- A. Source Limitations: For products listed together in the same Part 2 articles, obtain products from single source from single manufacturer.

## 1.7 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by people with disabilities, and for proper installation, adjustment, operation, cleaning, and servicing of accessories.
- B. Deliver inserts and anchoring devices set into concrete or masonry as required to prevent delaying the Work.

## 1.8 WARRANTY

- A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.

- 1. Warranty Period: 15 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: The design for accessories is based on Bobrick products indicated in the toilet and Bath Accessory Schedule at the end of Part 3. Subject to compliance with requirements, provide the named product or a comparable product by one of the following:

- 1. Toilet and Bath Accessories:
  - a. A & J Washroom Accessories, Inc.
  - b. American Specialties, Inc.
  - c. Bobrick Washroom Equipment, Inc.
  - d. Bradley Corporation.
  - e. General Accessory Manufacturing Co. (GAMCO).

### 2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, 0.031-inch (0.8-mm) minimum nominal thickness unless otherwise indicated.
- B. Brass: ASTM B 19, flat products; ASTM B 16/B 16M, rods, shapes, forgings, and flat products with finished edges; or ASTM B 30, castings.
- C. Steel Sheet: ASTM A 1008/A 1008M, Designation CS (cold rolled, commercial steel), 0.036-inch (0.9-mm) minimum nominal thickness.
- D. Galvanized-Steel Sheet: ASTM A 653/A 653M, with G60 (Z180) hot-dip zinc coating.
- E. Galvanized-Steel Mounting Devices: ASTM A 153/A 153M, hot-dip galvanized after fabrication.

- F. Fasteners: Screws, bolts, and other devices of same material as accessory unit and tamper-and-theft resistant where exposed, and of galvanized steel where concealed.
- G. Chrome Plating: ASTM B 456, Service Condition Number SC 2 (moderate service).
- H. Mirrors: ASTM C 1503, Mirror Glazing Quality, clear-glass mirrors, nominal 6.0 mm thick.
- I. ABS Plastic: Acrylonitrile-butadiene-styrene resin formulation.

## 2.3 FABRICATION

- A. General: Fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with full-length, continuous hinges. Equip units for concealed anchorage and with corrosion-resistant backing plates.
- B. General: One, maximum 1-1/2-inch- (38-mm-) diameter, unobtrusive stamped manufacturer logo, as approved by Architect, is permitted on exposed face of accessories. On interior surface not exposed to view or back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.
- C. Surface-Mounted Toilet Accessories: Unless otherwise indicated, fabricate units with tight seams and joints, and exposed edges rolled. Hang doors and access panels with continuous stainless-steel hinge. Provide concealed anchorage where possible.
- D. Recessed Toilet Accessories: Unless otherwise indicated, fabricate units of all-welded construction, without mitered corners. Hang doors and access panels with full-length, stainless steel hinge. Provide anchorage that is fully concealed when unit is closed.
- E. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of three keys to Owner's representative.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
  - 1. Comply with the ADA Accessibility Guidelines for Buildings and Facilities (ADAAG).
  - 2. Locate accessories as indicated on the Drawings.
- B. Secure mirrors to walls in concealed, tamper-resistant manner with special hangers, toggle bolts, or screws. Set units level, plumb, and square at locations indicated, according to manufacturer's written instructions for substrate indicated.
- C. Grab Bars: Install to withstand a downward load of at least 250 lbf (1112 N), when tested according to ASTM F 446.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation. Replace damaged or defective items.
- B. Remove temporary labels and protective coatings.

C. Clean and polish exposed surfaces according to manufacturer's written recommendations.

3.3 TOILET AND BATH ACCESSORY SCHEDULE

<u>Product Description</u>	<u>Series/Model No. (Bobrick except as indicated)</u>	<u>Remarks</u>
Paper Towel Dispenser	Kimberly Clark, Model 9736 (single) Model 9755 (double)	2' X 2" Lever handle operated.
Countertop Paper Towel Dispenser	B-526	C-fold or multi-fold
Toilet Seat Cover Dispenser	B-301	3 inch recess
Toilet Paper Dispenser	Georga Pacific: "Cormatic" 2 roll, Model 4c	Color as selected by Architect.
Baby Station - Horizontal	Koala KB110-SSRE	4 inch recess; stainless steel with liner dispenser
Single Line Grab Bars	B-6806 Series	Length as indicated on the Drawings.
Shower Grab Bars	B-6861	Right Angled Shower Stall
Foam Soap Dispenser	Waxie Nice Touch 800 ml, black.	1 dispenser per 2 sinks.
Mirrors	B-290	18 x 36 unless otherwise indicated.
Napkin/Tampon Dispenser	B-282 25	Surface mounted. One unit per each ladies stall.
Sanitary Napkin Disposal	B-354	Partition mounted between two compartments
Sanitary Napkin Disposal	B-254	Surface mounted
Mop and Broom Holder	B-223	36" -4 hooks
Coat Hook	B-2116	Concealed fasteners
Clothes Hook	B-6777	Concealed fasteners- satin stainless
Stainless Steel Shelf	B-298	8 inch deep shelf-x 18
Stainless Steel Shelf	B-295	5 inch deep shelf-x 24
Folding Shower Seat	B-517	Right hand
	B-518	Left hand

END OF SECTION 10 28 00

SECTION 10 41 15

KEY BOXES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: High security key boxes.

1.2 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Maintenance data.
- C. Warranty: Sample of special warranty.

1.3 QUALITY ASSURANCE

- A. UL listed.
- B. Comply with applicable Fire Department requirements.

1.4 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of key box that fail in materials or workmanship, including finish, within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B, suitable for exposed applications.
- B. Stainless-Steel Sheet: ASTM A 666, Type 304.
- C. Extruded Aluminum: ASTM B 221(ASTM B 221M), alloy and temper recommended by aluminum producer and manufacturer for type of use and finish indicated.
- D. Anchors: Material, type, and size required for secure anchorage to each substrate as recommended by manufacturer.

## 2.2 SECURITY KEY BOX

- A. Products: Subject to compliance with requirements, provide the following:
  - 1. Knox-Box 3200 Series, Recessed mount, high security key box, hinged door, double-action rotating tumblers and hardened steel.
  - 2. Hinges: Stainless steel door hinge.
  - 3. Finish: "Knox Coat" proprietary finish, color as selected by Architect.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Use manufacturer's recessed mounting kit, with shell housing and mounting hardware. Install level, plumb, and true.

END OF SECTION 10 41 15

SECTION 10 44 13

FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes fire protection cabinets for fire extinguishers and fire extinguishers.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.
- C. Samples: For each exposed product and for each color and texture specified.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.4 QUALITY ASSURANCE

- A. Fire-Rated, Fire Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.
- B. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
- C. Coordinate sizes and locations of fire protection cabinets with wall depths.

PART 2 - PRODUCTS

2.1 FIRE PROTECTION CABINET

- A. Cabinet Type: Suitable for fire extinguisher.
- B. Basis of Design: Subject to compliance with requirements, match the existing fire extinguisher cabinets, by Larsen's Manufacturing Co., "Architectural Series." Other extinguishers and cabinets may be considered subject to compliance with the specifications and visual match to the existing approved by the Architect.
  - 1. Cabinet shall be non-locking type.
- C. Cabinet Material: Stainless-steel sheet.
- D. Construction: Stainless steel box, with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld joints and grind smooth. Miter and weld perimeter door frames and trim.

- E. Cabinet Mounting: Suitable for the following mounting conditions:
  - 1. Semi-Recessed: Cabinet box (tub) recessed in walls of shallow depth with bullnose frame.
- F. Trim Style: Fabricate trim in one piece with corners mitered, welded, and ground smooth.
  - 1. Trim Metal: Stainless steel, ASTM A 167, AISI Type 302/304 alloy.
- G. Door Material and Construction: Manufacturer's standard door construction, of material indicated, coordinated with cabinet types and trim styles selected.
  - 1. Vertical Duo Door: 5/8' frameless door with 1/4" acrylic glazing. Door equipped with satin finish pull handle.
- H. Identify fire extinguisher in cabinet with FIRE EXTINGUISHER lettering applied to door. Provide lettering to comply with authorities having jurisdiction for letter style, color, size, spacing, and location.
  - 1. Application Process: Vinyl die cut.

## 2.2 FIRE EXTINGUISHERS

- A. General: Provide fire extinguishers for each cabinet and other locations indicated, in colors and finishes selected by Architect from manufacturer's standard that complies with authorities having jurisdiction.
- B. Multipurpose Dry Chemical Type: UL-rated 4-A:60-B:C, 10-lb nominal capacity, in enameled steel container.

## 2.3 STAINLESS STEEL CABINET FINISHES

- A. Remove or blend tool and die marks and stretch lines into finish.
- B. Grind and polish surfaces to produce uniform-directional, textured polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
  - 1. Bright, Directional Polish: AISI No. 4 finish.
- C. Passivate and rinse surfaces after polishing. Remove embedded foreign matter and leave surfaces chemically clean.

## 2.4 FABRICATION

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

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Examine walls and partitions for suitable framing depth and blocking where semirecessed cabinets will be installed and prepare recesses as required by type and size of cabinet and trim style.
- B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.

- C. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 44 13

SECTION 10 51 23

PLASTIC-LAMINATE-CLAD LOCKERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes plastic-laminate-clad wood lockers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of plastic-laminate-clad wood locker.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of locker.
- B. LEED Submittals:
  - 1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
  - 2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, cost for each regional material, and fraction by weight that is considered regional.
  - 3. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regionally manufactured materials. Include statement indicating cost for each regionally manufactured material.
    - a. Include statement indicating location of manufacturer and distance to Project for each regionally manufactured material.
  - 4. Certificates for Credit MR 7: Chain-of-custody certificates indicating that products specified to be made from certified wood comply with forest certification and chain-of-custody requirements. Include statement indicating cost for each certified wood product.
  - 5. Product Data for Credit IEQ 4.4: For adhesives and composite wood products, documentation indicating that products contain no urea formaldehyde.
- C. Shop Drawings: For plastic-laminate-clad wood lockers.
  - 1. Include plans, elevations, sections, details, and attachments to other work.
- D. Samples for Initial Selection: For the following:
  - 1. High-pressure decorative laminates.
  - 2. Thermoset decorative overlay panels.

E. Samples for Verification: For the following products:

1. Plastic-laminate-clad panels, not less than 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish.
2. Thermoset decorative-overlay-surfaced panels, not less than 8 by 10 inches (200 by 250 mm), for each type, color, pattern, and surface finish.
3. Exposed cabinet hardware and accessories, one unit for each type and finish.

1.4 INFORMATIONAL SUBMITTALS

- A. Sample Warranty: For special warranty.

1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For adjusting, repairing, and replacing locker doors and latching mechanisms to include in maintenance manuals.

1.6 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Full-size locker doors, complete with specified door hardware. Furnish no fewer than five doors of each type and color installed.
  2. Full-size units of the following locker hardware items equal to 5 percent of amount installed for each type and finish installed, but no fewer than 4 units:
    - a. Hinges.
    - b. Pulls.
    - c. Shelf rests.
    - d. Cylinder and drawer locks.

1.7 QUALITY ASSURANCE

- A. Manufacturer Qualifications: A qualified manufacturer that is certified for chain of custody by an FSC-accredited certification body.
- B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockup of typical corner, including door panel with specified door hardware, as shown on Drawings.
  2. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  3. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.8 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver lockers until painting and similar operations that could damage lockers have been completed in installation areas. If lockers must be stored in other-than-installation areas, store only in areas where environmental conditions are the same as those in final installation location, and comply with requirements specified in "Field Conditions" Article.

- B. Deliver master and control keys to Owner by registered mail or overnight package service

#### 1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install lockers until building is enclosed, wet work is complete, and HVAC system is operating and maintaining temperature between 60 and 90 deg F (16 and 32 deg C) and relative humidity between 17 and 50 percent during the remainder of the construction period.
- B. Field Measurements: Where lockers are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication, and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Locate concealed framing, blocking, and reinforcements that support lockers by field measurements before being enclosed, and indicate measurements on Shop Drawings.
- C. Established Dimensions: Where lockers are indicated to fit to other construction, establish dimensions for areas where lockers are to fit. Provide allowance for trimming at site, and coordinate construction to ensure that actual dimensions correspond to established dimensions.

#### 1.10 COORDINATION

- A. Coordinate sizes and locations of concealed wood support bases.
  - 1. Requirements are specified in Section 06 10 53 "Miscellaneous Rough Carpentry."
- B. Coordinate sizes and locations of framing, blocking, furring, reinforcements, and other related units of work specified in other Sections to ensure that lockers can be supported and installed as indicated.

#### 1.11 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of lockers that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures.
    - b. Faulty operation of locks or hardware.
    - c. Deterioration of wood and other materials beyond normal use.
  - 2. Warranty Period: Three years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Accessibility Requirements: For lockers indicated to be accessible, comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and ICC A117.1.

## 2.2 PLASTIC-LAMINATE-CLAD WOOD LOCKERS

- A. Basis of Design: Drawings are based on "2000 Series" by Ideal Products, Inc. Other manufacturers will be considered subject to compliance with requirements and approval of the Architect.
- B. Forest Certification: Fabricate lockers with wood-based panel products produced from wood obtained from forests certified by an FSC-accredited certification body to comply with FSC STD-01-001, "FSC Principles and Criteria for Forest Stewardship."
- C. Regional Materials: Lockers shall be manufactured within 500 miles (800 km) of Project site.
- D. Construction Style: Flush overlay.
- E. Locker Body: Fabricated from fire-retardant-particleboard-core panels covered on both sides with thermoset decorative overlay.
  - 1. Side Panels: 5/8 inch (16 mm) thick.
  - 2. Back Panel: 1/4 inch exterior grade medium density fiberboard.
  - 3. Top Panel: Manufacturer's standard 3/4 or 5/8 inch (19 or 16 mm) thick.
  - 4. Bottom Panel: Manufacturer's standard 3/4 or 5/8 inch (19 or 16 mm) thick.
  - 5. Exposed Panel Edges: Vinyl T-molding.
- F. Plastic-Laminate-Clad Wood Doors: High-pressure decorative laminate, Grade VGS, over both sides of fire-retardant-particleboard core.
  - 1. Thickness: 3/4 inch (19 mm) thick.
  - 2. Panel Edges: Vinyl T-molding.
- G. End Panels: Match style, material, construction, and finish of plastic-laminate-clad wood doors.
- H. Shelves: Fabricated from particleboard-core panels covered on both sides with thermoset decorative overlay; fixed.
  - 1. Thickness: 3/4 inch (19 mm).
- I. Plastic-Laminate Colors, Patterns, and Finishes:
  - 1. Match Architect's samples.

## 2.3 MATERIALS

- A. Composite Wood: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
  - 1. Recycled Content of Medium-Density Fiberboard and Particleboard: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
  - 2. Medium-Density Fiberboard: ANSI A208.2., made with binder containing no urea formaldehyde.
  - 3. Particleboard: ANSI A208.1, Grade M-2, made with binder containing no urea formaldehyde.
  - 4. Softwood Plywood: DOC PS 1, medium-density overlay.
  - 5. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for Test Methods 3.3, 3.4, 3.6, 3.8, and 3.10.
- B. High-Pressure Decorative Laminate: NEMA LD 3, Grade VGS.
- C. Fire-Retardant-Treated Materials: Where fire-retardant-treated materials are indicated, use materials impregnated with fire-retardant chemical formulations indicated by a pressure process or other means

acceptable to authorities having jurisdiction to produce products with fire-test-response characteristics specified.

1. Do not use treated material that does not comply with requirements of referenced material standards or material that is warped, discolored, or otherwise defective.
  2. Use fire-retardant-treatment formulations that do not bleed through or otherwise adversely affect finishes. Do not use colorants in solution to distinguish treated material from untreated material.
- D. Furring, Blocking, Shims, and Hanging Strips: Softwood or hardwood lumber, kiln dried to less than 15 percent moisture content.
- E. Anchors: Select material, type, size, and finish required for each substrate for secure anchorage. Provide metal expansion sleeves or expansion bolts for post-installed anchors. Use nonferrous-metal or hot-dip galvanized anchors and inserts at inside face of exterior walls and at floors.
- F. Wood Support Base: 2-by-4-inch nominal-size (51-by-102-mm, actual-size) lumber treated with manufacturer's standard preservative-treatment, pressure process.

## 2.4 HARDWARE

- A. General: Provide manufacturer's standard locker hardware complying with the requirements in this Section.
- B. Cylinder Locks: Built-in, flush cam locks with five-pin tumbler keyway, keyed separately and master keyed. Furnish two change keys for each lock and two master keys.
- C. Frameless Hinges (European Type): Fully concealed, nickel-plated steel, with not less than 125 degrees of opening.
1. Provide two hinges for doors 36 inches (910 mm) high and less.
  2. Provide three hinges for doors more than 36 inches (910 mm) high.
- D. Hooks: Manufacturer's standard, ball-pointed aluminum. Attach hooks with at least two fasteners.
1. Provide one double-prong ceiling hook for each compartment of double-tier lockers.

## 2.5 ACCESSORIES

- A. Number Plates: 1-1/2-inch- (38-mm-) diameter, etched, embossed, or stamped, satin chrome plates with black numbers and letters. Identify lockers in sequence selected by Owner.

## 2.6 FABRICATION

- A. Fabricate each locker with shelves, an individual door and frame, an individual top, a bottom, and a back, and with common intermediate uprights separating compartments.
1. Fabricate lockers to dimensions, profiles, and details indicated.
  2. Ease edges of corners of solid-wood members to 1/16-inch (1.5-mm) radius.
- B. Fabricate components square, rigid, without warp, and with finished faces flat and free of scratches and chips. Accurately factory machine components for attachments. Make joints tight and true.
1. Fabricate lockers using manufacturer's standard construction, with joints made with dowels, dados, or rabbets. Dado side panels to receive shelving except where indicated to be adjustable.
- C. Accessible Lockers: Fabricate as follows:

1. Locate bottom shelf no lower than 15 inches (381 mm) above the floor.
  2. Where hooks, coat rods, or additional shelves are provided, locate no higher than 48 inches (1219 mm) above the floor.
- D. Complete fabrication, including assembly, finishing, and hardware application, to maximum extent possible, before shipment to Project site. Disassemble components only as necessary for shipment and installation. Where necessary for fitting at site, provide ample allowance for scribing, trimming, and fitting.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine walls, floors, and support bases, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Verify that furring is attached to concrete and masonry walls that are to receive lockers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Condition lockers to average prevailing humidity conditions in installation areas before installation.
- B. Before installing lockers, examine factory-fabricated work for completeness and complete work as required, including removal of packing.

### 3.3 INSTALLATION

- A. Install wood support base with 1/2-inch- (13-mm-) thick plywood top.
- B. Install lockers level, plumb, and true; use concealed shims.
- C. Connect groups of lockers together with manufacturer's standard fasteners, through predrilled holes, with no exposed fasteners on face frames. Fit lockers accurately together to form flush, tight, hairline joints.
- D. Install lockers without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings, providing unencumbered operation. Complete installation of hardware and accessory items as indicated.
  1. Installation Tolerance: No more than 1/8 inch in 96-inch (3 mm in 2400-mm) sag, bow, or other variation from a straight line. Shim as required with concealed shims.
- E. Scribe and cut corner and filler panels to fit adjoining work using fasteners concealed where practical. Repair damaged finish at cuts.
- F. Install number plates after lockers are in place.

### 3.4 ADJUSTING, CLEANING, AND PROTECTION

- A. Clean, lubricate, and adjust hardware. Adjust doors to operate easily without binding. Verify that integral locking devices operate properly.
- B. Protect lockers from damage, abuse, dust, dirt, stain, or paint. Do not permit use during construction.

- C. Touch up marred finishes, or replace lockers that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by locker manufacturer.

END OF SECTION 10 51 23

SECTION 10 56 13

METAL STORAGE SHELVING

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. Four-post metal storage shelving.

1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance for Four-Post Metal Storage Shelving: Capable of withstanding the loads indicated according to MH 28.1.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated. Include rated capacities, construction details, material descriptions, dimensions of individual components and profiles, and finishes for metal storage shelving.
- B. LEED Submittals:
  - 1. Product Data for Credit IEQ 4.4: For particleboard, documentation indicating that product contains no urea formaldehyde.
- C. Shop Drawings: For customized metal storage shelving. Include plans, elevations, sections, details, and attachments to other work. Include installation details of connectors, lateral bracing, and special bracing.
- D. Samples for Initial Selection: For units with factory-applied color finishes. Include similar Samples of accessories involving color selection.
- E. Samples for Verification: For the following components, of size indicated below:
  - 1. Shelves: Full size, but not more than 24 inches wide by 12 inches deep (610 mm wide by 305 mm deep).
  - 2. Connectors for Shelf to Shelf to Post: Full size.
  - 3. Shelf-Label Holders: Full size.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: For each type of metal storage shelving from manufacturer.

## 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal storage shelving to include in maintenance manuals.

## 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials from same production run that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Shelves: Full-size units equal to 5 percent of amount installed for each type indicated, but no fewer than five shelves.
  - 2. Shelf-to-Post Connectors: Full-size units equal to 5 percent of amount installed for each type indicated, but no fewer than 10 connectors.

## 1.8 QUALITY ASSURANCE

- A. Source Limitations: Obtain metal storage shelving from single source from single manufacturer.

## 1.9 PROJECT CONDITIONS

- A. Environmental Limitations: Do not deliver or install metal storage shelving until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

## 1.10 COORDINATION

- A. Coordinate sizes and locations of blocking and backing required for installation of metal storage shelving attached to wall and ceiling assemblies.
- B. Coordinate locations and installation of metal storage shelving that may interfere with ceiling systems including lighting, HVAC, speakers, sprinklers, access panels, electrical switches or outlets, and floor drains.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.
- C. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with G60 (Z180) zinc (galvanized) or A60 (ZF180) zinc-iron-alloy (galvannealed) coating.
- D. Steel Tubing: ASTM A 513, Type 2.
- E. Particleboard: ANSI A208.1[, made with binder containing no urea formaldehyde].

## 2.2 FOUR-POST METAL STORAGE SHELVING

- A. Open Four-Post Metal Storage Shelving: Factory-formed, field-assembled, freestanding system, designed for shelves to span between and be supported by corner posts, with shelves adjustable over the height of shelving unit. Fabricate initial shelving unit with a post at each corner. Fabricate additional shelving units as add-on units, designed to share two corner posts with initial shelving unit. Provide fixed top and bottom shelves, adjustable intermediate shelves, and accessories indicated.
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
    - a. Adjustable Shelving Products; a division of Karp Associates, Inc.
    - b. Borroughs Corporation.
    - c. Lyon Workspace Products, LLC.
    - d. Rousseau Metal Inc.
    - e. Safco Products; a division of LDI.
    - f. Spacesaver Corporation.
    - g. Western Pacific Storage Systems.
  2. Load-Carrying Capacity per Shelf: 350 lb (159 kg).
  3. Posts: Fabricated from hot-rolled steel; in manufacturer's standard shape; with perforations at 1-1/2 inches (38 mm) o.c. to receive shelf-to-post connectors.
  4. Bracing: Manufacturer's standard, single or double diagonal cross bracing at back and ends; as required for stability, load-carrying capacity of shelves, and number of shelves.
  5. Solid-Type Shelves: Fabricated from particle board or steel sheet.
  6. Shelf Quantity: Three or more shelves per shelving unit in addition to top and bottom shelf.
  7. Shelf-to-Post Connectors: Manufacturer's standard.
  8. Base: Open, with exposed post legs.
  9. Overall Unit Width: 30 inches (762 mm), unless indicated otherwise.
  10. Overall Unit Depth: 12 inches (305 mm).
  11. Overall Unit Height: 72 inches (1829 mm), unless indicated otherwise.
  12. Finish: Baked enamel or powder coat.
    - a. Color and Gloss: As selected by Architect from manufacturer's full range.

## 2.3 FABRICATION

- A. Shop Fabrication: Prefabricate shelving components in shop to greatest extent possible to minimize field fabrication; temporarily preassemble shelving components where necessary to ensure that field-assembled components fit together properly. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.
- B. Fabricate metal storage shelving square and rigid, with posts plumb and true and shelves flat and free of dents or distortion. Fabricate connections to form a rigid structure, free of buckling and warping.
1. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
  2. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.
  3. Build in straps, plates, brackets, and other reinforcements as needed to support shelf loading.
  4. Cut, reinforce, drill, and tap metal fabrications to receive hardware, fasteners, and similar items.
- C. Form metal in maximum lengths to minimize joints. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing the Work.
- D. Form edges and corners free of sharp edges or rough areas. Fold back and crimp exposed edges of unsupported sheet metal to form a 1/2-inch- (13-mm-) wide hem on the concealed side; ease edges of metal plate to radius of approximately 1/32 inch (0.8 mm). Shear and punch metals cleanly and accurately. Remove burrs.

## 2.4 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## 2.5 STEEL FINISHES

- A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" or SSPC-SP 8, "Pickling."
- B. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for cleaning, pretreatment, application, and minimum dry thickness.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine floors for suitable conditions where metal storage shelving will be installed.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Vacuum finished floor and wet mop floor over which metal storage shelving is to be installed.

### 3.3 INSTALLATION

- A. Install metal storage shelving level, plumb, square, rigid, true, and with shelves flat and free of dents or distortion. Make connections to form a rigid structure, free of buckling and warping.

### 3.4 ERECTION TOLERANCES

- A. Erect four-post metal storage shelving to a maximum tolerance from vertical of 1/2 inch (13 mm) in up to 10 feet (3 m) of height, not exceeding 1 inch (25 mm) for heights taller than 10 feet (3 m).

### 3.5 ADJUSTING

- A. Adjust metal storage shelving so that connectors and other components engage accurately and securely.
- B. Adjust and lubricate operable components to operate smoothly and easily, without binding or warping. Check and readjust operating hardware.

- C. Touch up marred finishes or replace metal storage shelving that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by metal storage shelving manufacturer.
- D. Replace metal storage shelving that has been damaged or has deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 10 56 13

SECTION 11 31 00

RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Microwave Oven.
2. Refrigerator/freezers.
3. Dishwashers.

1.2 SUBMITTALS

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

B. LEED Submittals:

1. Product Data for Credit EA 1.4: For appliances indicated, documentation that products are ENERGY STAR rated.

C. Samples: For each exposed finish.

D. Appliance Schedule: Use same designations indicated on Drawings.

E. Maintenance data.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.

B. 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.

C. Residential Appliances: Comply with NAECA standards.

D. Energy Ratings: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer of each appliance specified agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.

1. Microwave Oven: Five-year limited warranty for defects in the magnetron tube.
2. Refrigerator/Freezer: Five-year limited warranty for in-home service on the sealed refrigeration system.
3. Dishwasher: 10-year warranty for in-home service against deterioration of tub and door liner.

## 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. Basis-of-Design Product: The design for each residential appliance is based on the product named. Subject to compliance with requirements, provide either the named product or a comparable product by one of the following:
    - a. Amana Appliances.
    - b. Hotpoint.
    - c. KitchenAid.
    - d. Maytag.
    - e. Jenn-Air.
    - f. Sub-Zero Freezer Co., Inc.
    - g. Viking Range Corporation.
    - h. Whirlpool Corporation.
    - i. ColdTech, Inc.
    - j. Marvel Industries.

### 2.2 COOKING APPLIANCES

- A. Microwave Oven: Free standing microwave oven, listed by UL, and complying with the requirements of Whirlpool model No.WMC30516AS, 1.6 cu. ft. capacity, stainless steel, with 1,200 watts cooking power.

### 2.3 REFRIGERATION APPLIANCES

- A. Refrigerator/freezer: Whirlpool model No.WRS950SIAM, 30 cu. ft. capacity, stainless steel, 2 adjustable "MicroEdge" shelves, single full width crisper, gallon storage, automatic ice maker.

### 2.4 CLEANING APPLIANCES

- A. Dish Washer: Whirlpool model No.WDF750SAYM, Whirlpool "Gold Series," with stainless steel tub.

### 2.5 FINISH

- A. Provide manufacturer's standard factory-applied enamel finish color as selected by Architect. Appliances shall be the same color and finish.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and rough openings are completely concealed.
- B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

C. Utilities: Refer to Divisions 22 and 26 for plumbing and electrical requirements.

END OF SECTION 11 31 00

SECTION 12 24 13

ROLLER WINDOW SHADES

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. Manually operated roller shades with single rollers and with double rollers.
  - 2. Motor-operated roller shades with double rollers.

1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include styles, material descriptions, construction details, dimensions of individual components and profiles, features, finishes, and operating instructions for roller shades.
- B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.
  - 1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.
- C. Samples: For each exposed product and for each color and texture specified, 10 inches (250 mm) long.
- D. Roller-Shade Schedule: Use same designations indicated on Drawings.

1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roller shades to include in maintenance manuals.

1.5 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Roller Shades: Full-size units equal to 5 percent of quantity installed for each size, color, and shadeband material indicated, but no fewer than two units.

1.6 QUALITY ASSURANCE

- A. Installer PVC-Free Shadecloth: Comply with the following:

1. Environmental Certification: Submit written certification from the manufacturer, including third party evaluation, recycling characteristics, and perpetual use certification as specified below. Initial submittals, which do not include the Environmental Certification, below will be rejected. Materials that are simply 'PVC free' without identifying their inputs shall not qualify as meeting the intent of this specification and shall be rejected.
  2. Third Party Evaluation: Provide documentation stating the shade cloth has undergone third party evaluation for all chemical inputs, down to a scale of 100 parts per million, that have been evaluated for human and environmental safety. Identify any and all inputs, which are known to be carcinogenic, mutagenic, teratogenic, reproductively toxic, or endocrine disrupting. Also identify items that are toxic to aquatic systems, contain heavy metals, or organohalogens. The material shall contain no inputs that are known problems to human or environmental health per the above major criteria, except for an input that is required to meet local fire codes.
  3. Recycling Characteristics: Provide documentation that the shade cloth can, and is part of a closed loop of perpetual use and not be required to be down cycled, incinerated or otherwise thrown away. Scrap material can be sent back to the mill for reprocessing and recycling into the same quality yarn and woven into new material, without down cycling. Certify that this process is currently underway and will be utilized for this project.
  4. Perpetual Use Certification: Certify that at the end of the useful life of the shade cloth, that the material can be sent back to the manufacturer for recapture as part of a closed loop of perpetual use and that the material can and will be reconstituted into new yarn, for weaving into new shade cloth. Provide information on each shade band indicating that the shade band can be sent back to the manufacturer for this purpose.
- B. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution.
1. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver roller shades in factory packages, marked with manufacturer, product name, and location of installation using same designations indicated on Drawings.

#### 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install roller shades until construction and finish work in spaces, including painting, is complete and dry and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.
- B. Field Measurements: Where roller shades are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on Shop Drawings. Allow clearances for operating hardware of operable glazed units through entire operating range. Notify Architect of installation conditions that vary from Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design: Subject to compliance with requirements, provide products by MechoShade or comparable products acceptable to the Architect. Other manufacturer's that provide comparable products include, but are not limited to, the following:
  - 1. Draper Inc.
  - 2. Hunter Douglas Contract.
  - 3. MechoShade Systems, Inc.
- B. Source Limitations: Obtain roller shades from single source from single manufacturer.

### 2.2 MANUALLY OPERATED SUN SHADES WITH SINGLE ROLLERS

- A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
  - 1. Basis of Design: MechoShade, "ThermoVeil" dense basket weave, 1500 series (3% open area).

### 2.3 MANUALLY OPERATED SHADES WITH DOUBLE ROLLERS

- A. Chain-and-Clutch Operating Mechanisms: With continuous-loop bead chain and clutch that stops shade movement when bead chain is released; permanently adjusted and lubricated.
  - 1. Basis of Design: MechoShade, "ThermoVeil" dense basket weave, 1500 Series (3% open area) sunscreen with "Classic" blackout shadecloth.0700 Series (opaque).
  - 2. Color and Finish: As selected by Architect from manufacturer's full range.
- B. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller mounting configuration, roller assemblies, operating mechanisms, installation accessories, and installation locations and conditions indicated.
  - 1. Color and Finish: As selected by Architect from manufacturer's full range.
- C. Installation Accessories:
  - 1. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
  - 2. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
  - 3. Installation Accessories Color and Finish: As selected from manufacturer's full range.

### 2.4 MANUAL OPERATED CHAIN DRIVE HARDWARE AND BRACKETS

- A. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.
- B. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.

- C. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
- D. Provide shade hardware system that allows for operation of multiple shade bands (multi-banded shades) by a single chain operator, subject to manufacturer's design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.
- E. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.
- F. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable.
- G. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.
- H. Provide manufacturer's drive bracket and brake assembly.
- I. Drive Chain: #10 qualified stainless steel chain rated to 90 lb. (41 kg) minimum breaking strength. Nickel plate chain shall not be accepted.

## 2.5 MOTOR-OPERATED, DOUBLE-ROLLER SHADES

- A. Motorized Operating Systems: Provide factory-assembled, shade-operator systems of size and capacity and with features, characteristics, and accessories suitable for conditions indicated, complete with electric motor and factory-prewired motor controls, power disconnect switch, enclosures protecting controls and operating parts, and accessories required for reliable operation without malfunction. Include wiring from motor controls to motors. Coordinate operator wiring requirements and electrical characteristics with building electrical system.
  - 1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 2. Electric Motor: Manufacturer's standard tubular, enclosed in rollers.
  - 3. Remote Control: Requirements for Electronic Hardware, Controls, and Switches:
    - a. Roller shade hardware, shade fabric, EDU, and all related controls shall be furnished and installed as a complete two-way communicating system and assembly.
- B. Motorized Shade Hardware and Shade Brackets:
  - 1. Provide shade hardware constructed of minimum 1/8-inch (3.18 mm) thick plated steel, or heavier, thicker, as required to support 150 percent of the full weight of each shade. Plastic components without use of steel angle construction do not meet the intent of this specification and shall not be accepted.
  - 2. Provide shade hardware system that allows for field adjustment of EDU or replacement of any operable hardware component without requiring removal of brackets, regardless of mounting position (inside, or outside mount).
  - 3. Provide shade hardware system that allows for operation of multiple shade bands offset by a maximum of 8-45 degrees from the EDU axis between shade bands (4-22.5 degrees) on each side of the radial line, by a single shade EDU (multi-banded shade, subject to manufacturer's design criteria).
- C. Bands within a single EDU group shall be aligned within 1/4 inch (6 mm).
- D. Installation Accessories:

1. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
2. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
3. Installation Accessories Color and Finish: As selected from manufacturer's full range.

## 2.6 ROLLER-SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for flexible, chain-loop devices; lead content of components; and warning labels.
- B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):
  1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch (6 mm) per side or 1/2-inch (13-mm) total, plus or minus 1/8 inch (3.1 mm). Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, accurate locations of connections to building electrical system, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 ROLLER-SHADE INSTALLATION

- A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.
- B. Electrical Connections: Connect motor-operated roller shades to building electrical system.

### 3.3 ADJUSTING

- A. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

### 3.4 CLEANING AND PROTECTION

- A. Clean roller-shade surfaces a
- B. fter installation, according to manufacturer's written instructions.
- C. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that roller shades are without damage or deterioration at time of Substantial Completion.

- D. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to adjust, operate, and maintain motor-operated roller shades.

END OF SECTION 12 24 13

SECTION 12 36 61

SIMULATED STONE COUNTERTOPS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. This Section includes composite surfacing for the following applications:
  - 1. Countertops.
  - 2. Bathroom vanities.

1.2 RELATED SECTIONS

- A. Section 06 10 53 – Miscellaneous Rough Carpentry: Blocking.
- B. Division 22 - Plumbing Fixtures: Sinks, faucets.

1.3 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Product description.
  - 2. Fabrication instructions and recommendations.
  - 3. Storage and handling requirements and recommendations.
  - 4. Installation methods.
- B. Shop Drawings:
  - 1. Indicate dimensions, edge configurations, cutouts, and relationship to adjacent construction.
  - 2. Show locations and sizes of furring, blocking, including concealed blocking and reinforcement specified in other Sections.
  - 3. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacle and other items installed in durable surfaces.
- C. Samples:
  - 1. For each type of product indicated.
    - a. Submit minimum 4 by 4 inch (102 by 102 mm) sample in specified gloss.
    - b. Cut sample and seam together for representation of inconspicuous seam.
    - c. Indicate full range of color and pattern variation.
  - 2. Approved samples will be retained as a standard for Work.
- D. Maintenance Data: Cleaning instructions, scratch removal procedures, and materials harmful to countertops.

1.4 REFERENCES

- A. ASTM C 97 - Test Method for Absorption and Bulk Specific Gravity of Dimensional Stone.
- B. ASTM C 109 - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using

2 inch (50-mm) Cube Specimens).

- C. ASTM C 293 - Standard Test Method for Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading).
- D. ASTM C 642 - Standard Test Method for Density, Absorption, and Voids in Hardened Concrete.
- E. ASTM C 666 - Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing (Superseded).
- F. ASTM C 1028 - Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
- G. ASTM C 1260 - Standard Test Method for Potential Alkali Reactivity of Aggregates (Mortar-Bar Method).
- H. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
- I. NSF/ANSI 51 - Food Equipment Materials, Food Contact.

#### 1.5 QUALITY ASSURANCE

- A. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
  - 1. Finish areas designated by Architect.
  - 2. Do not proceed with remaining work until workmanship, color, and sheen are approved by Architect.
  - 3. Refinish mock-up area as required to produce acceptable work.
- B. Installer: Trained and approved by composite surface manufacturer.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Do not deliver components to project site until products are ready for installation.
- B. Store components indoors prior to installation.
- C. Handle materials to prevent damage.
- D. Provide protective coverings to prevent physical damage or staining following installation for duration of project.

#### 1.7 PROJECT CONDITIONS

- A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

### PART 2 PRODUCTS

#### 2.1 MANUFACTURERS

- A. Approved Manufacturer: IceStone, 63 Flushing Avenue, Unit 283, Bldg. 12, Brooklyn, NY 11205. Telephone: (718) 624-4900. Fax: (718) 624-4002. Web: [www.icestone.biz](http://www.icestone.biz). E-mail:

info@icestone.biz.

- B. Requests for substitutions will be considered in accordance with provisions of Section 01 25 00.

## 2.2 MATERIAL

### A. Approved Product: IceStone.

1. Composition: 100 percent recycled glass in a cement matrix.
2. Physical Performance Characteristics:
  - a. Compressive Strength: 13,000 psi (914 Km/cm), in accordance with ASTM C 109.
  - b. Flexural Strength: 890 psi (63 Km/cm), in accordance with ASTM C 293.
  - c. Specific Gravity: 2.31, in accordance with ASTM C 97.
  - d. Porosity/Absorption: 0.18 percent, unsealed, in accordance with ASTM C 642.
  - e. Chemical Durability: 0.05 percent expansion, in accordance with ASTM C 1260 for ASR Reactivity.
  - f. Freeze Thaw: 0.49 percent expansion, 300 cycles, in accordance with ASTM C666.
  - g. Fire Rating: Class 1 (A), in accordance with ASTM E 84. Flame spread index: 0. Fuel contribution: 0. Smoke density index: 0.
  - h. Polished Finish, Coefficient of Static Friction: 0.69 (dry); 0.61 (wet), ASTM C 1028.
3. Weight and Thickness:
  - a. Weight: 16.3 pounds per square foot at 1-1/4 inches (32 mm) thick.
  - b. Finished Thickness: 1-1/4 inch (31 mm).
4. Edge Detail: As indicated.
5. Color: As selected from manufacturer's full range.
6. Surface Finish:
  - a. Polished, high-gloss.

## 2.3 ACCESSORIES

- A. Sealant: Low-VOC or no-VOC mildew-resistant sealant, FDA-compliant, NSF 51-compliant for food contact, to match durable surface. Apply sealer per the sealer manufacturer's instructions to protect surface from staining.
1. Product: As recommended by composite surface manufacturer.
    - a. Miracle 511 H20 Plus.
    - b. Nano 1000 Sealer.
    - c. Buddy Rhodes Natural Look Penetrating + Satin Sealer.
    - d. Protex by Tenax.
- B. Sink/Lavatory Mounting Hardware: Stainless steel bowl clips, panel inserts and fasteners and epoxy for attachment of undermount sinks and lavatories.
- C. Sealer:
1. Miracle 511 H20 Plus.
  2. Nano 1000 Sealer.
  3. Buddy Rhodes Natural Look Penetrating + Satin Sealer.

4. Protex by Tenax.
  5. Flooring: Sealer shall be slip resistant.
- D. Wax: Apply wax after installation to protect surface from staining or etching.
1. Cheng's Concrete Countertop Wax
  2. Goddard's Granite and Marble Liquid Polish

## 2.4 FACTORY FABRICATION

- A. Shop Assembly: Fabricate using standard stone cutting equipment in accordance with manufacturer's fabrication and installation guidelines.
1. Fabricate components to greatest extent practical to sizes and shapes indicated, in accordance with approved shop drawings and manufacturer's printed instructions.
  2. Form joints between components without conspicuous joints.
  3. Provide factory cutouts for plumbing fittings and bath accessories as indicated on Drawings.
  4. Rout and finish component edges with minimum radius of 1/8 (3 mm).
    - a. Rout cutouts, radii and contours to template.
    - b. Shape inside corner radius to minimum of 1/4 inch (6 mm) to relieve corner stress.
    - c. Smooth edges.
    - d. Repair or replace defective and inaccurate work.

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.
- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

### 3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions including but not limited to the following:
1. Four-Sided Perimeter Support: Provide a four-sided perimeter frame for countertops, and IceStone will not require a substrate. Provide front-to-back support every 36 inches (914 mm), in addition to the strong perimeter support, for spans within cabinets.
  2. Three-Sided Perimeter Support: For structures that have perimeter support on three sides (desks and frameless cabinets) additional support is required. IceStone with a depth of less than 26 inches (660 mm) require supports every 24 inches (610 mm). IceStone with depths of over 26 inches (660 mm) require supports every 18 inches (457 mm).
  3. Cutouts and Rod Supports: Surface mount sinks will require 2 inches (51 mm). Undermount sinks will require 3 inches (76 mm). All openings need to be rodged for extra support and that some openings will need to be field cut. Support cutouts with 1/8 by 1/2 inch (3 by 12 mm)

stainless steel or aluminum strips set vertically in 3/4 inch (19 mm) deep saw blade kerf positioned in the center of both the front and back bridge to extend a minimum of 24 inches (610 mm) beyond the opening to the left and to the right. Encapsulate the reinforcement "rod" with AKEMI Marmorkitt 1000 Waterclear Flowing 2 Part Polyester Adhesive.

- B. Clean and polish surfaces in accordance with manufacturer's care and maintenance instructions.

#### 3.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion, as directed by Architect.

END OF SECTION 12 36 61

SECTION 12 48 13

ENTRANCE FLOOR MATS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes:
  - 1. Entrance mats.
  - 2. Recessed frames.

1.2 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Samples: For each floor mat and frame member.

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 ENTRANCE FLOOR MATS AND FRAMES, GENERAL

- A. Regulatory Requirements: Comply with applicable provisions in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines for Buildings and Facilities and ICC A117.1.

2.2 ROLL-UP RAIL MATS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide "M1 Pedimat" as manufactured by C/S Group or a comparable product by one of the following:
  - 1. Arden Architectural Specialties, Inc.
  - 2. C/S Group.
  - 3. J. L. Industries, Inc.
  - 4. Pawling Corporation; Architectural Products Division.
- B. Exposed hinge rail connectors shall be extruded 6063-T6 aluminum. Complete with perforations for drainage. Tread rail shall be manufactured from high-impact vinyl/acrylic, complete with co-extruded soft-durameter cushions.
  - 1. Colors, Textures, and Patterns of Inserts: As selected by Architect from full range of industry colors.
  - 2. Rail Color: As selected by Architect from full range of industry colors and color densities.
  - 3. Tread Insert: HD - "MonoTuft Carpet," CRI standard for good indoor air quality. Fibers shall include a minimum of 100, 12 mil monofilament fibers per square inch. Color: As selected by Architect from full range of manufacture's colors (22). Carpet weight shall be 33 oz./sq.yd.

- C. Mat Frames: LB – Level base frame shall be ¾ inch deep recessed frame in 6063-T5 aluminum alloy with ¼ inch wide exposed surface. Conforming to ASTM B 221 (ASTM B 221M). Frame color As selected by Architect from full range of manufacture’s colors (7).

## 2.3 FABRICATION

- A. Floor Mats: Shop fabricate units to greatest extent possible in sizes indicated. Unless otherwise indicated, provide single unit for each mat installation; do not exceed manufacturer's recommended maximum sizes for units that are removed for maintenance and cleaning. Where joints in mats are necessary, space symmetrically and away from normal traffic lanes. Miter corner joints in framing elements with hairline joints or provide prefabricated corner units without joints.
- B. Coat concealed surfaces of aluminum frames that contact cementitious material with manufacturer's standard protective coating.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install recessed mat frames to comply with manufacturer's written instructions. Set mat tops at height recommended by manufacturer for most effective cleaning action; coordinate tops of mat surfaces with bottoms of doors that swing across mats to provide clearance between door and mat.
- B. Install surface-type units to comply with manufacturer's written instructions at locations indicated; coordinate with entrance locations and traffic patterns.

### 3.2 PROTECTION

- A. After completing frame installation and concrete work, provide temporary filler of plywood or fiberboard in recesses and cover frames with plywood protective flooring. Maintain protection until construction traffic has ended and Project is near Substantial Completion.

END OF SECTION 12 48 13

SECTION 12 61 00

AUDITORIUM SEATING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This section includes the following:
  - 1. Fixed auditorium seating.

1.3 SUBMITTALS

- A. Product data for each type of furniture item and assembly accessory required. Submit written data on physical characteristics, durability, and flame resistance characteristics.
- B. Samples for initial selection purposes in standard size samples showing full range of colors, textures, and patterns available for each type of item required.
- C. Samples for verification purposes prepared from same material to be used for the work:
  - 1. 6 inch square samples of each type of upholstery and fabric finish required.
  - 2. 12 inch square samples of each paint finish required.
  - 3. 12 inch square samples of each plastic laminate required.
- D. Seating layout: Prior to fabrication, provide a fully dimensioned seating plan developed from the Drawings. Show all chairs and sizes, aisle widths. The successful bidder must assume complete responsibility for the accuracy of all chair measurements. Seating plan shall conform to the following:
  - 1. Center to center distance between chairs in a row may vary (22 inches typical) as required to provide staggered seating from row to row. The middle seat of a given row shall have a sight line between (2) chairs directly in front yet the end of every row shall align with the end of the row in front and behind it.
  - 2. Back to back spacing of rows shall be 3'-9" min.
  - 3. Provide seating as indicated plus wheelchair positions where indicated.
  - 4. Provide a left handed tablet arm for the chair at the left end of each row. All other tablet arms shall be right handed.
  - 5. Locate aisles as indicated.
- E. Material test reports from qualified independent testing laboratory indicating and interpreting test results relative to compliance of materials with requirements indicated.
- F. Maintenance data for furniture for inclusion in Maintenance Manual specified in Division 1.

## 1.4 QUALITY ASSURANCE

- A. Single Source Responsibility: Obtain fixed classroom seating types from one source from a single manufacturer.
- B. Fire Performance Characteristics: Provide furniture that is identical to that tested for the following fire performance requirements, according to test method indicated, by UL, BIFMA, ANSI, or other testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Surface Burning Characteristics as follows:
    - a. Flame Spread: Not more than 25.
    - b. Smoke Developed: Not more than 50.
    - c. Test Method: ASTM E-84.
  - 2. Fire Performance Characteristics of padding as follows:
    - a. Test Method: Federal Test Method Standard 191.
  - 3. Rating: Average burn length not exceeding 8 inch. Average flame time not exceeding 15 seconds after removal from source.
  - 4. Flammability as follows:
    - a. Test Method: F-11-1987 BIFMA First Generation Voluntary Upholstery Furniture Flammability Standards for Business and Institutional Markets.
    - b. Rating: Certified as complying with requirements for Class A fabric.
- C. Physical Properties: Provide furniture that is identical to that tested for the following physical properties, according to test method indicated by UL, BIFMA, ANSI, or other testing and inspecting agency acceptable to authorities having jurisdiction.

## 1.5 WARRANTY

- A. Special Product Warranty: Submit a written warranty, executed by Manufacturer, agreeing to repair or replace seating which fails in materials or workmanship within the specified warranty period. This warranty shall be in addition to, and not a limitation of, other rights the Owner may have against the Contractor under the Contract Documents.
  - 1. Warranty period is 3 years after date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Available Manufacturers: Drawings are based on KI (Krueger International, Inc.), Model No. CPSP/CPBACK22/2/P2, "Concerto " seats with dual steel tube uprights. Auditorium seating by other manufacturers will be considered, subject to compliance with the specified requirements. Esthetic appearance is reason to reject proposed equivalent or substitution.

### 2.2 AUDITORIUM SEATING

- A. Description: Fixed upholstered seating with polyurethane foam back. 34" fixed back. Verify pitch position of back with Architect..

- B. Seat and Back: Upholstered seat and wood back. Seat foam shall be 3" thick. Wood back panel shall be 3/8 inch thick with gum veneer core and 1/16 inch veneer faces. Outer face of wood back panel shall be grade A. Back shall be stained to match Architect's sample.
- C. Armrests: Upholstered arm caps to match seat.
- D. Base: Floor mounted.
- E. Tablet Arm: Single motion, medium size , minimum 3/4" particle board with 1/16" plastic laminate.
- F. Provide materials in colors and patterns as selected by Architect from manufacturers complete line of colors and patterns including premium colors. Provide powder -coated finish on metal and fabric upholstered seat.
- G. Provide seat numbering.
- H. Row end panels shall have plastic laminated closure panels with aisle lights.

### 2.3 FINISHES

- A. Metal Finishes: Manufacture's standard powder finish, color as selected .
- B. Plastic laminate finish as specified by Architect from laminate manufacturer's premium line.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install auditorium furniture after other finishing operations, including painting, have been completed.

### 3.2 PROTECTION

- A. Protection furniture against damage during remainder of construction period, complying with manufacturer's direction.
- B. Provide additional protection as needed to ensure that furniture will not be damaged or deteriorated at time of Substantial Completion.

END OF SECTION 12 61 00

SECTION 12 93 13

BICYCLE RACKS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Exterior bicycle racks.

1.3 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Maintenance Data: For bicycle racks to include in maintenance manuals.

PART 2 - PRODUCTS

2.1 EXTERIOR BICYCLE RACKS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide "High Security Bike Rack - Revised" bicycle rack, product number MPPR 4306P as manufactured by Arizona Correctional Industries.
- B. Bicycle Rack Height: Height as indicated on drawings.
- C. Bicycle Rack Construction: Fully welded construction.
  - 1. Hanger: Materials
    - a. Body: 1-1/4 inch schedule 40 steel pipe.
    - b. Rails: 2 inch schedule 40 steel pipe.
  - 2. Finish: Powder coat, color as selected by Architect
  - 3. Security: Designed to lock wheel and frame.
  - 4. Mounting: Expansion bolt 10 gage sheet steel end caps.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of site furnishings where required.
- B. Install bicycle racks level, plumb, true, and securely anchored at locations indicated on Drawings.

3.2 CLEANING

- A. After completing bicycle rack installation, inspect components. Remove spots, dirt, and debris. Repair damaged finishes to match original finish or replace component.

END OF SECTION 12 93 13

SECTION 12 93 16  
SKATEBOARD RACKS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes wood skateboard racks.

1.2 ACTION SUBMITTALS

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

1.3 CLOSEOUT SUBMITTALS

- A. Maintenance data.

PART 2 - PRODUCTS

2.1 SKATEBOARD RACKS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Boardloch, "Spartan 7 – Pedestal" skateboard rack as manufactured by Advanced Northwest Welding, LLC., or comparable product acceptable to the Architect.
- B. Materials: Galvanized steel.
  - 1. 1-1/2" mild steel tubing, 0.095 inch wall thickness.
  - 2. 1" by 2" mild steel channel, 1/8 inch thick.
  - 3. 5/16 inch thick, solid steel ring, 3 inch I.D.
  - 4. 2 inch by 2 inch square steel tubing, 0.095 inch wall thickness.
- C. Capacity: Seven skateboards, padlocked.
- D. Dimensions: 36 inches high, 11 inches wide.
- E. Mounting: Pedestal mounted (free standing).
- F. Finish: Factory galvanized.

2.2 FABRICATION

- A. Factory Assembly: Assemble components in the factory to greatest extent possible to minimize field assembly. Clearly mark units for assembly in the field.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's written installation instructions unless more stringent requirements are indicated. Complete field assembly of skateboard racks where required.
- B. Install skateboard racks plumb, true, level and securely anchored at locations indicated on Drawings.

END OF SECTION 12 93 16

SECTION 14 21 00

MACHINE ROOM-LESS ELEVATORS

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 machine room-less passenger and service elevators.

1.3 DEFINITIONS

- A. Definitions in ASME A17.1 apply to work of this Section.
- B. Defective Elevator Work: Operation or control system failure, including excessive malfunctions; performances below specified ratings; excessive wear; unusual deterioration or aging of materials or finishes; unsafe conditions; need for excessive maintenance; abnormal noise or vibration; and similar unusual, unexpected, and unsatisfactory conditions.
- C. Service Elevator: A passenger elevator that is also used to carry freight.

1.4 SUBMITTALS

- A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for the following:
  - 1. Car enclosures and hoistway entrances.
  - 2. Operation, control, and signal systems.
- B. Shop Drawings: Show plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment and signals. Include large-scale layout of car control station. Indicate variations from specified requirements, maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
- C. Samples for Verification: For exposed finishes of cars, hoistway doors and frames, and signal equipment; 3-inch- (75-mm-) square Samples of sheet materials; and 4-inch (100-mm) lengths of running trim members.
- D. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
  - 1. In addition to items specified in Division 01 Section "Operation and Maintenance Data," include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
- E. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.

- F. Warranty: Special warranty specified in this Section.
- G. Continuing Maintenance Proposal: Service agreement specified in this Section.

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or manufacturer's authorized representative who is trained and approved for installation of units required for this Project.
- B. Source Limitations: Obtain elevators through one source from a single manufacturer.
  - 1. Provide major elevator components, including driving machines, controllers, signal fixtures, door operators, car frames, cabs, and entrances, manufactured by a single manufacturer.
- C. Regulatory Requirements: Comply with ASME A17.1.
- D. Accessibility Requirements: Comply with Section 4.10 in the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." And 407 in ICC A117.1.
- E. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing at as close to neutral pressure as possible according to NFPA 252 or UL 10B.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging.
- B. Store materials, components, and equipment off of ground, under cover, and in a dry location. Handle according to manufacturer's written recommendations to prevent damage, deterioration, or soiling.

#### 1.7 COORDINATION

- A. Coordinate installation of sleeves, block outs, elevator equipment with integral anchors, and other items that are embedded in concrete or masonry for elevator equipment. Furnish templates, sleeves, elevator equipment with integral anchors, and installation instructions and deliver to Project site in time for installation.
- B. Coordinate sequence of elevator installation with other work to avoid delaying the Work.
- C. Coordinate locations and dimensions of other work relating to electric traction elevators including pit ladders, sumps, and floor drains in pits; entrance subsills; and electrical service, electrical outlets, lights, and switches in pits and hoistways.

#### 1.8 WARRANTY

- A. Special Manufacturer's Warranty: Manufacturer's standard form in which manufacturer agrees to repair, restore, or replace defective elevator work within specified warranty period.
  - 1. Warranty Period: One year from date of Substantial Completion.

## 1.9 MAINTENANCE SERVICE

- A. Initial Maintenance Service: Beginning at Substantial Completion, provide one year's full maintenance service by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
1. Perform maintenance, including emergency callback service, during normal working hours.
  2. Include 24-hour-per-day, 7-day-per-week emergency callback service.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide ThyssenKrupp "Synergy" building-supported Standard Series elevators with Machine-Room-less application or comparable products by one of the following:
1. KONE Inc.
  2. Otis Elevator Co.
  3. Schindler Elevator Corp.
  4. ThyssenKrupp Elevator.

### 2.2 SYSTEMS AND COMPONENTS

- A. General: Provide manufacturer's standard elevator systems. Where components are not otherwise indicated, provide standard components published by manufacturer as included in standard preengineered elevator systems and as required for complete system.

Elevator Machines: Provide variable-voltage, variable-frequency, ac-type hoisting machines. Provide solid-state power converters.

1. Provide line filters or chokes to prevent electrical peaks or spikes from feeding back into building power system.
- B. Fluid for Oil Buffers: If oil buffers are used, use only fire-resistant hydraulic fluid containing antioxidant, anticorrosive, antifoaming, and metal-passivating additives.
1. Available Product: Subject to compliance with requirements, a product that may be incorporated into the Work includes, but is not limited to, "Hydro Safe (FR)" by Hydro Safe Oil Division, Inc.
- C. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work where installation of devices is specified in another Section.
- D. Machine Beams: Provide framing to support elevator hoisting machine and deflector sheaves from the building structure. Comply with Division 05 Section "Metal Fabrications" for materials and fabrication.
- E. Car Frame and Platform: Welded steel units.

### 2.3 OPERATION SYSTEMS

- A. General: Provide manufacturer's standard microprocessor operation system as required to provide type of operation system indicated.

- B. Group Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators and elevator groups where indicated.
  - 1. Independent Service: Keyswitch in car control station removes car from group operation and allows it to respond only to car calls. Key cannot be removed from keyswitch when car is in independent service. When in independent service, doors close only in response to door close button.
- C. Security Features: Provide the following security features, where indicated. Security features shall not affect emergency firefighters' service.
  - 1. Card-Reader Operation: System uses card readers at car control stations and hall push-button stations to authorize calls. Security system determines which landings and at what times calls require authorization by card reader. Provide required conductors in traveling cable and panel in machine room for interconnecting card readers, other security access system equipment, and elevator controllers. Provide stripe-swipe card reader integral with each car control station.
    - a. Security access system equipment is specified in Division 28 Section "Access Control."

#### 2.4 DOOR REOPENING DEVICES

- A. Infrared Array: Provide door reopening devices with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more of the light beams shall cause doors to stop and reopen.
- B. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

#### 2.5 FINISH MATERIALS

- A. General: Provide the following materials for exposed parts of elevator car enclosures, car doors, hoistway entrance doors and frames, and signal equipment as indicated.
- B. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, commercial steel, Type B, exposed, matte finish.
- C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- D. Stainless-Steel Bars: ASTM A 276, Type 304.
- E. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.
- F. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063.

#### 2.6 CAR ENCLOSURES

- A. General: Provide steel-framed car enclosures with nonremovable wall panels, with car roof, access doors, power door operators, and ventilation.
  - 1. Provide standard railings complying with ASME A17.1 on car tops where required by ASME A17.1.
  - 2. Provide finished car including materials and finishes specified below.
- B. Materials and Finishes: Provide manufacturer's standards, but not less than the following:
  - 1. Subfloor: Underlayment grade, exterior plywood, 5/8-inch (16-mm) nominal thickness.

2. Floor Finish: Specified in a Division 09 Section.
3. Stainless-Steel Wall Panels: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
4. Fabricate car with recesses and cutouts for signal equipment.
5. Fabricate car door frame integrally with front wall of car.
6. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
7. Sight Guards: Provide sight guards on car doors.
8. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick.
9. Luminous Ceiling: Fluorescent light fixtures and ceiling panels of translucent acrylic or other permanent rigid plastic.
10. Handrails: Manufacturer's standard stainless steel handrails, of shape, and finish indicated.

## 2.7 HOISTWAY ENTRANCES

- A. General: Provide manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Provide frame size and profile to coordinate with hoistway wall construction.
- B. Materials and Fabrication: Provide manufacturer's standards, but not less than the following:
  1. Stainless-Steel Frames: Formed from stainless-steel sheet.
  2. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
  3. Sight Guards: Provide sight guards on doors matching door edges.
  4. Sills: Extruded metal, with grooved surface, 1/4 inch (6.4 mm) thick.
  5. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107.

## 2.8 SIGNAL EQUIPMENT

- A. Car Control Stations: Provide manufacturer's standard recessed car control stations. Mount in return panel adjacent to car door, unless otherwise indicated.
  1. Mark buttons and switches with standard identification for required use or function that complies with ASME A17.1. Use both tactile symbols and Braille.
  2. Provide "No Smoking" sign matching car control station, either integral with car control station or mounted adjacent to it, with text and graphics as required by authorities having jurisdiction.
- B. Emergency Communication System: Provide system that complies with ASME A17.1 and the U.S. Architectural & Transportation Barriers Compliance Board's "Americans with Disabilities Act (ADA), Accessibility Guidelines for Buildings and Facilities (ADAAG)." On activation, system dials preprogrammed number of monitoring station and identifies elevator location to monitoring station. System provides two-way voice communication without using a handset and provides visible signals that indicate when system has been activated and when monitoring station has responded. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
- C. Firefighters' Two-Way Telephone Communication Service: Provide flush-mounted cabinet in each car and required conductors in traveling cable for firefighters' two-way telephone communication service specified in Division 28 Section "Fire Detection and Alarm."
- D. Car Position Indicator: Provide illuminated, digital-type car position indicator, located above car door or above car control station. Also provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served.
  1. Include travel direction arrows if not provided in car control station.

- E. Hall Push-Button Stations: Provide one hall push-button station at each landing[ for each single elevator or group of elevators, but not less than one station for each four elevators in a group].
  - 1. Provide manufacturer's standard wall-mounted units.
  - 2. Equip units with buttons for calling elevator and for indicating desired direction of travel.
    - a. Provide a means for passengers to indicate that they have disabilities so control system can allow extra room in assigned car.
    - b. Provide for connecting units that require destination registration to building security access system so a card reader can be used to register calls.
  
- F. Hall Lanterns: Units with illuminated arrows; but provide single arrow at terminal landings. Provide the following:
  - 1. Manufacturer's standard wall-mounted units, for mounting above entrance frames.
  
- G. Hall Annunciator: With each hall lantern, provide audible signals indicating car arrival and direction of travel. Signals sound once for up and twice for down.
  - 1. At manufacturer's option, audible signals may be placed on each car.
  
- H. Fire Command Center Annunciator Panel: Provide panel containing illuminated position indicators for each elevator, clearly labeled with elevator designation; include illuminated signal that indicates when elevator is operational and when it is at the designated emergency return level with doors open. Provide standby power elevator selector switches, as required by ASME A17.1, adjacent to position indicators. Provide illuminated signal that indicates when normal power supply has failed.

## 2.9 ELEVATORS

- A. Elevator Description: Service Elevators.
  - 1. Type: Machine room-less traction.
  - 2. Machine Location: No machine room is provided..
  - 3. Travel (maximum): 60 ft. Freight elevator shall travel to roof.
  - 4. Rated Capacity: 4000 lb.
  - 5. Rated Speed: 350 fpm.
  - 6. Platform Size: As indicated.
  - 7. Clear Inside Dimensions: Minimum 7'- 8" wide, 5'- 5" deep.
  - 8. Cab Height: 7'-3".
  - 9. Entrance Type and Width: Center-Open Doors 3' 6" (1067 mm).
  - 10. Entrance Height: 7' 0" (2134 mm).
  - 11. Car Lighting Power Supply: 120 Volts, Single-phase, 15 Amp, 60 Hz.
  - 12. Signal Fixtures: Manufacturer's standard with metal button targets.
  - 13. Controller Location: Machine-Room Less Controllers shall be located at the front opening of the top terminal landing in entrance frame or remote location.
  - 14. Operation: Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.
  - 15. Cab Design:
    - a. Entrance Doors and Frames: Single speed doors, satin stainless steel.
    - b. Cab Walls: Satin stainless steel with manufacturer's flat bar stainless steel railings at sides and rear of cab.
    - c. Ceiling: Manufacturer's standard incandescent downlights in stainless steel ceiling.
  - 16. Car and Hall Fixtures: Manufacturer's standard hall lanterns and vandal resistant buttons.
  - 17. Provide the Elevator Owner's Manual to NAU as part of close-out submittals.
  
- B. Elevator Description: Passenger Elevators.

1. Type: Machine room-less traction.
2. Machine Location: No machine room is provided.
3. Travel (maximum): 46 ft.
4. Rated Capacity: 4000 lb.
5. Rated Speed: 350 fpm.
6. Platform Size: As indicated.
7. Clear Inside Dimensions: Minimum 7'- 8" wide, 5'- 5" deep.
8. Cab Height: 7'-3".
9. Entrance Type and Width: Center-Open Doors 3' 6" (1067 mm).
10. Entrance Height: 7' 0" (2134 mm).
11. Car Lighting Power Supply: 120 Volts, Single-phase, 15 Amp, 60 Hz.
12. Machine Location: Inside the hoistway at the top of the hoistway.
13. Signal Fixtures: Manufacturer's standard with metal button targets.
14. Controller Location: Machine-Room Less Controllers shall be located at the front opening of the top terminal landing in entrance frame or remote location.
15. Operation: Simplex Collective Operation: Using a microprocessor-based controller, operation shall be automatic by means of the car and hall buttons. If all calls in the system have been answered, the car shall park at the last landing served.
16. Operating Features – Standard.
  - a. Full Collective Operation.
  - b. Anti-nuisance.
  - c. Fan and Light Protection.
  - d. Load Weighing Bypass.
  - e. Independent Service.
  - f. Firefighters' Service .
  - g. Top of Car Inspection.
17. Cab Design:
  - a. Entrance Doors and Frames: Single speed doors, satin stainless steel.
  - b. Cab Walls: Laminate with stainless steel dividers.
  - c. Ceiling: Manufacturer's standard incandescent downlights and ceiling.
18. Car and Hall Fixtures: Manufacturer's standard hall lanterns and vandal resistant buttons.
19. Provide the Elevator Owner's Manual to NAU as part of close-out submittals.
20. Additional Requirements:
  - a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finish.
  - b. Provide blanket hooks and one complete set(s) of full-height protective blankets.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine elevator areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance. Examine hoistways, hoistway openings, pits, and machine rooms as constructed; verify critical dimensions; and examine supporting structure and other conditions under which elevator work is to be installed.
  1. For the record, prepare a written report, endorsed by Installer, listing dimensional discrepancies and conditions detrimental to performance or indicating that dimensions and conditions were found to be satisfactory.
  2. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. Comply with manufacturer's written instructions.
- B. **Welded Construction:** Provide welded connections for installing elevator work where bolted connections are not required for subsequent removal or for normal operation, adjustment, inspection, maintenance, and replacement of worn parts. Comply with AWS standards for workmanship and for qualifications of welding operators.
- C. **Sound Isolation:** Mount rotating and vibrating equipment on vibration-isolating mounts designed to minimize transmission of vibrations to structure and thereby minimize structure-borne noise from elevator system.
- D. Lubricate operating parts of systems, including ropes, as recommended by manufacturers.
- E. **Alignment:** Coordinate installation of hoistway entrances with installation of elevator guide rails for accurate alignment of entrances with car. Where possible, delay final adjustment of sills and doors until car is operable in shaft. Reduce clearances to minimum, safe, workable dimension at each landing.
- F. **Leveling Tolerance:** 1/8 inch (3 mm), up or down, regardless of load and direction of travel.
- G. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
- H. Locate hall signal equipment for elevators as follows, unless otherwise indicated:
  - 1. For groups of elevators, locate hall push-button stations between two elevators at center of group or at location most convenient for approaching passengers.
  - 2. Place hall lanterns either above or beside each hoistway entrance.
  - 3. Mount hall lanterns at a minimum of 72 inches (1829 mm) above finished floor.

### 3.3 FIELD QUALITY CONTROL

- A. **Acceptance Testing:** On completion of elevator installation and before permitting use (either temporary or permanent) of elevators, perform acceptance tests as required and recommended by ASME A17.1 and by governing regulations and agencies.
- B. **Operating Test:** Load one elevator of each type, capacity, speed, and travel distance to rated capacity and operate continuously for 30 minutes over full travel distance, stopping at each level and proceeding immediately to the next. Record temperature rise of elevator machine during 30-minute test period. Record failure to perform as required.
- C. Advise Owner, Architect, and authorities having jurisdiction in advance of dates and times tests are to be performed on elevators.

### 3.4 PROTECTION

- A. **Temporary Use:** Limit temporary use for construction purposes to Service Elevator only. Comply with the following requirements for elevator used for construction purposes:
  - 1. Provide car with temporary enclosure, either within finished car or in place of finished car, to protect finishes from damage.
  - 2. Provide strippable protective film on entrance and car doors and frames.
  - 3. Provide padded wood bumpers on entrance door frames covering jambs and frame faces.
  - 4. Provide other protective coverings, barriers, devices, signs, and procedures as needed to protect elevator and elevator equipment.
  - 5. Do not load elevators beyond their rated weight capacity.

6. Engage elevator Installer to provide full maintenance service. Include preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as necessary for proper elevator operation at rated speed and capacity. Provide parts and supplies same as those used in the manufacture and installation of original equipment.
7. Engage elevator Installer to restore damaged work, if any, so no evidence remains of correction. Return items that cannot be refinished in the field to the shop, make required repairs and refinish entire unit, or provide new units as required.

### 3.5 DEMONSTRATION

- A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain elevator(s). Refer to Division 01 Section "Demonstration and Training."
- B. Check operation of each elevator with Owner's personnel present and before date of Substantial Completion. Determine that operation systems and devices are functioning properly.
- C. Check operation of each elevator with Owner's personnel present not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

END OF SECTION 14 21 00