



**DLR Group**

Architecture  
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**P I N A L ♦ C O U N T Y**  
*wide open opportunity*

**Pinal County  
Pinal County Superior Courts  
Expansion  
Florence, Arizona**

Project Manual - Volume IIA

**Pinal County Contract No. 53110003**

DLR Group Project No. 30-15122-00

January 14, 2016

**100% CONSTRUCTION  
DOCUMENTS**

Pinal County  
121 W. 22<sup>nd</sup> Street, Florence, AZ 85132

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## SECTION 01 1000 - SUMMARY

### PART 1 - GENERAL

#### 1.1 CONDITIONS AND REQUIREMENTS

- A. Division 01 - General Requirements govern work under all Divisions of Specifications.
- B. This is a General Contractor Bid delivery method project and will be conducted as such. As such the General Contractor will manage and coordinate all subcontractors and suppliers for the work.
- C. The Project Manual contains language which will require the contractor to provide special services. Contractor is advised to review General Requirements and Division 01 requirements carefully.

#### 1.2 PROJECT ADDRESS

- A. Location: This project is located in the Town of Florence, Arizona.

#### 1.3 WORK COVERED BY CONSTRUCTION DOCUMENTS

- A. Project Description: Pinal County Superior Courthouse Expansion to the existing superior courthouse located in Florence Arizona. Provide construction services as indicated in project description below.
- B. The construction of this project will be done in a manner that will not disrupt the function and operations of the existing facility. Coordination with the County / Courts and plant staff shall be done once the installation schedule is determined and on a weekly basis for updates of the scheduled activities that may affect the operations of the Superior Court.
- C. Work should be considered to run concurrently.
- D. Special Purchasing Requirements:
  - 1. This project involves work on Pinal County Superior Courts active Courthouse complexes. The Contractor is advised to review carefully the rules and regulations for non-employees and Security working within and close proximity to the courts operations.
  - 2. The work required for interior spaces will require close coordination through shop drawing development and constructions scheduling to not disrupt courts operations.

#### 1.4 PHASES OF WORK

- A. Work will be performed to minimize the impact on the operating facility. The majority of work is to be performed adjacent to the facility with some work inside the existing facility. Security will be a top priority thru all phase and must be maintained at all times.

- B. There are two phases of construction: Phase one is the security upgrades to existing courthouse identified as alternate number 3. Phase two is full project completion.

#### 1.5 CONTRACT DOCUMENTS

- A. Drawings: See drawing index on Drawings.
- B. Project Manuals: Volumes I, IIA, and IIB.
- C. Addenda: All addenda issued prior to bidding.

#### 1.6 PRECEDENCE OF DOCUMENTS

- A. In general, Documents take precedence in following descending order: Owner/Contractor Agreement, Amended General Conditions, General Conditions, written description, and illustrated description. Drawings are diagrammatic or not to scale; they are intended to convey scope, general arrangements, relationship of materials approximate locations, and general appearance. In general, Drawings govern in matters of quantity and Specification governs in matters of quality. In event of discrepancies between Drawings involving quantities, or in Specification involving quality, greater quantity or quality shall apply. Shop Drawings or similar submittals are non-contractual unless incorporated by appropriately executed contract modification

#### 1.7 ABBREVIATIONS PERTAINING TO CONTRACT DOCUMENTS

- A. Owner: Pinal County
- B. User: Pinal County Superior Courts
- C. Architect: DLR Group
- D. CFCI: Contractor Furnished Contractor Installed (All work unless note otherwise)
- E. OFCI: Owner Furnished Contractor Installed
- F. OFOI: Owner Furnished Owner Installed
- G. CCD: Construction Change Directive
- H. Furnish: To purchase and deliver
- I. Install: To place into final position and connect
- J. Provide: To furnish and install
- K. "As Shown," "as detailed," "as indicated," or words of similar import mean as indicated on the drawings.

- L. “As selected,” ”as approved,” or words of similar import mean as selected by, as **prior** approved by, or as accepted by the Architect and Owner
- M. “Approved equal,” “or prior approved equal” shall mean as approved and accepted by the Architect and Owner **prior** to bidding. No substitutions are allowed after awarding of Contract
- N. “Shall” means mandatory
- O. “As required” means as required by the contract documents
- P. “As necessary” means essential to the completion of the work
- Q. “Concealed” means not visible in the finished work
- R. “Exposed” means visible in the finished work
- S. “Days” means calendar days
- T. Substantial Completion: That stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use.
- U. Engineer shall equal Architect as defined in the General Conditions of the Contract for Construction

#### 1.8 EXAMINATION OF SITE

- A. Failure to visit the site will not relieve the subcontractors from any requirement to furnish materials or to perform work that is contained within the Contract Documents. Such work will be performed at no additional cost to the Project.
- B. If any subcontractor discovers asbestos, or any other items beyond the scope of this project, the Owner, Contractor and Architect must be notified immediately so that remediation or other appropriate actions may be taken.

#### 1.9 CONTRACTOR USE OF SITE

- A. Regulatory Requirements:
  - 1. Comply with Arizona Revised Statutes, Section 13-391, 113-392, 13-1002, 31-203, 31-204, 32-22, 32-230, 31-231, 31-393, 31-395. These statutes are incorporated into the Contract Documents and shall apply whenever inmates of the Department of Corrections are present at the job site and will apply to all officers and employees of the Contractors.
  - 2. See Rules and Regulations for Non-Employees of Department of Corrections.
  - 3. Operations of Contractor: Limited to areas where work is indicated
- B. Construction Operations: Limited to the “limits of construction” as noted on the site plan. Any storage space or yards required shall be coordinated with the owner.

- C. Construction Staff Parking: Shall be limited to the area designed on the construction site plan, and will be managed by the General Contractor. No vehicles shall be parked or allowed to be used within 100 feet of an occupied facility without prior approval of Pinal County Superior Courts Security Staff.
- D. Site Access: Vehicles with company logos only are to have access within the construction fenced perimeter. Personal vehicles will not be allowed inside the fenced construction perimeter.
- E. Operating Facilities: For work inside the existing courthouse, all workers, tools and materials that enter are subject to inspections upon entry and exit, and will be required to keep full inventory of all parts and tools.
- F. Utility connections: Interruption of utility services to the existing building(s) is not permitted. Do not connect new utilities to existing utilities without notifying Owner. All utility connections shall be scheduled with Pinal County with a minimum 48 hours in advance of the Work.

#### 1.10 PERMITS, FEES AND NOTICES

- A. City and County permits and inspections are required.
- B. The Contractor shall coordinate and schedule all county dust permits and all inspections necessary for the proper execution and completion of the Work. This shall include, but not be limited to:
  - 1. Inspections and Certificates from Town of Florence Fire Department.
  - 2. Inspections and Certificates from the State Fire Marshall.
  - 3. Arizona Corporation Commission
  - 4. ADEQ permits to construct and to operate

#### 1.11 PHASES OF WORK

- A. The work under this contract is only one portion of the overall project. Other portions of the Project may be constructed by other contractors under separate contracts. The construction work under these other contracts may begin prior to completion of the work under this Contract. The General Contractor and its subcontractors shall coordinate their work with that of the other trades.

#### 1.12 APPROVED APPLICATORS

- A. Where specific instructions in the Specifications require that a particular product and/or material be applied and/or installed by an "approved applicator" it shall be the Contractor's responsibility to insure that any Subcontractor or Sub subcontractor used for such Work is in fact currently certified by the particular Manufacturer for this type of installation or application.

1.13 FUTURE WORK

- A. The work under this contract is only one portion of the overall Project. Other portions of the Project will be constructed by other Contractors under separate contracts, including, but not limited to, utility tie-in and overall building construction. The construction work under these other contracts may begin prior to the completion of the work under this Contract. Contractor and its subcontractors shall coordinate their work with that of the other Contractors.

1.14 OWNER OCCUPANCY

- A. The site will have fully functional Superior Courts in operation during the time of Work.
- B. Cooperate with Owner to minimize conflict, and to facilitate Owner's operations.
- C. Owner/User will require a 10 day "Shake-down" period prior to occupancy.
- D. Schedule the Work to accommodate this requirement.

1.15 REFERENCE DATA

- A. Reference data made available to the Contractor is for the Contractor's information only, and neither the Owner nor the Architect assumes any responsibility for the Contractor's conclusions.
- B. The Contractor shall establish and maintain all buildings and construction grades, lines, levels, and bench marks. This Work shall be performed by a licensed Civil Engineer or Surveyor under the employ of the Contractor, who shall certify to the Architect that he has performed this service.
- C. The Contractor shall not remove any property line markers or monuments or data established by the Owner.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION



SECTION 01 2100 - ALLOWANCES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 ALLOWANCES

- A. The Contractor shall include in the Contract Sum all allowances stated in Division 01 Section "Allowances." Items covered by these allowances shall be supplied for such amount and by such persons as the Owner may direct, but the Contractor will not be required to employ persons against whom he makes a reasonable objection.
- B. Unless otherwise provided in the Contract Documents:
  - 1. These allowances shall cover the cost to the Contractor, less any applicable trade discount, of the materials and equipment required by the allowance delivered at the site, and all applicable taxes;
  - 2. The Contractor's costs for unloading and handling on the site, labor, installation costs, overhead, profit, and other expenses contemplated for the original bid shall be included in the Contract Sum and not in the allowance;
  - 3. Whenever the cost is more than or less than the allowance, the Contract Sum shall be adjusted accordingly by Change Order.

1.3 ALLOWANCES

- A. The Contractor shall allow Three Hundred Thousand Dollars (\$300,000) to accommodate an Owner Allowance for Owner approved construction changes. This shall not include work explained or inferred anywhere in the construction documents.

PART 2 - PRODUCTS - (Not Applicable)

PART 3 - EXECUTION - (Not Applicable)

END OF SECTION



SECTION 01 2300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

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

1.4 PROCEDURES

- A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.
  - 1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete functional installation whether or not indicated as part of the alternate.
- B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.
- C. Execute accepted alternates under the same conditions as other work of the Contract.

- D. Schedule: A schedule of alternates is included at the end of this Section. Specification Sections referenced in schedule contain requirements for materials necessary to achieve the work described under each alternate.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 SCHEDULE OF ALTERNATES

- A. Alternate No. 1: Traction Elevator Cab and Equipment
1. Base Bid: Provide the elevator shaft enclosure, sump pump, associated plumbing, and exhaust fan to allow the owner to add the elevator system and equipment at a later date.
  2. Alternate Bid: Provide the traction elevator cab, required structural beams, all associated controllers and equipment, electrical tie in, and fire alarm in its entirety for a fully operating complete and functioning system.
- B. Alternate No. 2: Three Hearing Rooms on Level 3
1. Base Bid: In the Hearing Rooms numbered: 3404, 3409, and 3413, provide main mechanical distribution trunks, temporary fire suppression, temporary lighting, and complete fire alarm system. Provide rough-ins for audio/visual, security, and tele/data. All millwork, finishes, audio/visual equipment, tele/data equipment, and security equipment to be purchased and installed by the owner at a later date. In Rooms numbered 3402, 3406, 3407, and 3411, provide audio-visual rough-ins
  2. Alternate Bid: Provide all millwork, finishes, audio/visual equipment, tele/data equipment, and security equipment the same as indicated on Level 4.
- C. Alternate No. 3: Security Upgrade to Existing Courthouse
1. Base Bid:
    - a. Furnish and install the Card Access System and Security Video System as specified in Div 28 Specification Sections and identified on the Security Electronics Drawings.
    - b. Base Bid **excludes** the following: replacing all existing cameras, adding cameras in the existing stairwells, adding cameras in the existing Courthouse and adding cameras to the site.
    - c. As part of the Base Bid, furnish and install the head end equipment (patch panels, switches, servers, storage arrays, etc.) to accommodate the entire system build out of the Security Video System for the Base Bid and all Alternates.
  2. Alternate Bid:
    - a. All existing analog cameras in the existing Courthouse facility and on the site are to be replaced with IP cameras. Furnish and install additional IP cameras in the existing Courthouse (this Alternate excludes adding cameras in the existing stairwells) and on the site as specified in Div 28 Specification Sections and identified on the Security Electronics Drawings.





## SECTION 01 2500 - SUBSTITUTION PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section describes procedures for submitting, processing, and handling of requests for substitution and product options. Any substitution or option shall be in accordance with provisions of Contract Documents.
- B. See Instructions to Bidders and General Conditions for additional information.

#### 1.3 SUBMITTALS

- A. Address submittals to Architect through the General Contractor.

#### 1.4 PRODUCT SELECTION - GENERAL

- A. Base all bids on materials, equipment and procedures specified.
- B. Certain types of equipment and kinds of material are described in Specifications by means of trade names, catalog numbers and/or manufacturer's names. This is not intended to exclude from consideration other items which may be capable of accomplishing the purpose indicated.
- C. Other types of equipment and kinds of material may be acceptable to Owner and Architect. (Prior approval required; see Invitation for Bids Packet in Volume I of documents, for format).
- D. Listing of a manufacturer implies acceptance of them only as supplier of a product which complies with specified item.
- E. Equipment, materials and methods of construction, if not specifically indicated, must be approved in writing by Architect and be agreed upon by Owner prior to letting of Contract.
- F. Architect reserves the right to require substitute items to comply color- and pattern-wise with base specified items, if necessary to achieve "design intent."
- G. No substitution will be permitted after submission of bids..
- H. Conditional bids and voluntary alternates will not be considered.

#### 1.5 CONTRACTOR'S OPTIONS

- A. For products specified only by reference standards, any product meeting standards may be used.

- B. For products specified by naming several products or manufacturers, use any product or manufacturer named.
- C. For products specified by naming one manufacturer and product, and several optional manufacturers or products, select any named product and manufacturer which meets all specification criteria.
  - 1. Contract Documents are based upon use of primary manufacturer.
  - 2. By use of optional manufacturer or product, subcontractor acknowledges that he will be responsible for all adjustments to fit product to the Work and for providing all additional work, equipment, and services required by use of product, at no additional cost to Owner.

#### 1.6 REQUESTS FOR SUBSTITUTION

- A. Requests for substitution shall be issued through the General Contractor.
- B. Requests for substitution shall be received no later than 10 working days prior to submission of bid, unless as allowed under article 1.8.

#### 1.7 SUBMITTAL DATA

- A. Complete data substantiating compliance of proposed substitution with Contract Documents. (Note: It is the responsibility of the submitter to supply the Architect with complete description and technical information so that the Architect can properly appraise the submittal. Lack of proper and sufficient information will be sufficient cause for rejection. Burden of proof of merit of requested substitution is on submitter.)
- B. For products:
  - 1. Products identification, including manufacturer's name.
  - 2. Manufacturer's literature, **marked to indicate specific model, type, size, and options to be considered:**
    - a. Product description.
    - b. Performance and test data.
    - c. Reference standards.
    - d. Difference in power demand, air quantities, etc.
    - e. Dimensional differences from specified unit.
  - 3. Full size samples if requested. Architect reserves the right to impound sample until physical units are installed on project for comparison purposes. Requester will pay all costs of furnishing and return of samples. Architect is not responsible for loss of, or damage to, samples.
  - 4. Name and address of similar projects and name of Owner's Representative who can be contacted to discuss product, installation, and field performance data.
    - a. List other DLR Group projects for which the submitted product has been approved for use.
- C. For construction methods:
  - 1. Detailed description of proposed method.
  - 2. Illustrate on drawings.
- D. Itemized comparison of proposed substitute to specified item.

- E. Data relating to changes in construction schedule.
- F. Relation to separate contracts.
- G. Cost of proposed substitution in comparison with product or method specified.

1.8 SUBSTITUTION AFTER BID DATE

- A. No substitutions will be considered after submittal of Bid except for non-availability of specified item due to strikes, lockouts, bankruptcy, discontinuance of production, proven shortage, or similar occurrences or when the Contractor pays the Owner a credit acceptable to the Owner and compensates the Architect for additional review time.
- B. Notify Architect, in writing (with a copy being sent to the Architect with substantiating data) as soon as non-availability becomes apparent, to avoid delay in construction.
- C. Forward submittal data as required for substitutions above.

1.9 REJECTION OF SUBSTITUTION OR OPTIONAL ITEMS

- A. Substitutions and/or options will not be considered if:
  - 1. They are indicated or implied on shop drawings, or project data submittals, without formal request submitted in accordance with this Section.
  - 2. Acceptance will require substantial revision of Contract Documents or building spaces.
  - 3. Request for substitution does not indicate specific item for which request is submitted. Acceptance of a manufacturer only will not be made.

1.10 PRIOR APPROVALS

- A. Prior approval does not automatically mean equipment is approved. Final submittals and shop drawings shall be made as required by the Specifications for final approval of all equipment and materials. Any changes required due to substitution are the subcontractor's responsibility.

PART 2 - PRODUCTS - (Not Applicable)

PART 3 - EXECUTION - (Not Applicable)

END OF SECTION



SECTION 01 2613 - REQUESTS FOR INTERPRETATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes: Administrative requirements for requests for information / interpretation.

1.3 DEFINITIONS

- A. Request For Information / Interpretation (RFI):
  - 1. A document submitted by the Contractor requesting clarification of a portion of the Contract Documents, hereinafter referred to as RFI.
  - 2. A properly prepared request for information / interpretation shall include a detailed written statement that indicates the specific Drawing(s) or Specification(s) in need of clarification where information is not clearly shown on the Contract Documents and the nature of the clarification requested.
    - a. Drawings shall be identified by Drawing number and location on the Drawing sheet.
    - b. Specifications shall be identified by Section number, page and paragraph.
    - c. Requests for Information: Request made by Contractor concerning information not indicated on Drawings nor contained in Project Manual that is required to properly perform the work.
    - d. Requests for Interpretation: Request made by Contractor in accordance with the Contract for construction.
- B. Improper RFIs:
  - 1. RFIs that is not properly prepared.
  - 2. RFIs which request information that is clearly shown on the Contract Documents.
  - 3. Improper RFIs will be rejected by the Owner's Representative and/or the Architect and returned.
- C. The Contractor shall fully acquaint himself with the Bid Documents prior to bidding this Project.

1.4 CONTRACTOR'S REQUESTS FOR INFORMATION

- A. RFIs shall be submitted on Document 01 2613a - Request for Information / Interpretation included at the end of this Section.
  - 1. Electronic forms shall be completely filled in and electronically distributed to the Architect's Construction Administrator via e-mail.
  - 2. RFIs shall be submitted in numerical order with no breaks in the consecutive numbering.

3. Each page of attachments to RFIs shall bear the RFI number and shall be consecutively numbered in chronological order.
  4. RFIs shall be legibly scanned and submitted electronically.
- B. When the Contractor is unable to determine from the Contract Documents the material, process or system to be installed, the Owner's Representative shall be requested to make a clarification of the indeterminate item.
- C. RFIs shall be originated by the Contractor.
1. RFIs from subcontractors or material suppliers shall be submitted through, reviewed by, and signed by the Contractor prior to submittal to the Owner's Representative.
  2. RFIs from subcontractors or material suppliers sent directly to the Owner's Representative, Architect or the Architect's consultants shall not be accepted and will be returned unanswered.
- D. Contractor shall carefully study the Contract Documents to assure that the requested information is not available therein. RFIs that request information available in the Contract Documents will be deemed either "improper" or "frivolous" as noted above.
- E. In the cases where RFIs are issued to request clarification of coordination issues, for example, pipe and duct routing, clearances, specific locations of work shown diagrammatically, and similar items, the Contractor shall fully lay out a suggested solution using drawings or sketches drawn to scale, and submit same with the RFI. RFIs which fail to include a suggested solution will be returned unanswered with a requirement that the Contractor submit a complete request.
- F. RFIs shall not be used for the following purposes:
1. To request approval of submittals,
  2. To request approval of substitutions,
  3. To request changes which are known to entail additional cost or credit. (A Change Order Request form shall be used.)
  4. To request different methods of performing work than those drawn and specified.
- G. In the event the Contractor believes that a clarification by the Architect results in additional cost or time, Contractor shall not proceed with the work indicated by the RFI until a Change Order is prepared and approved. RFIs shall not automatically justify a cost increase in the work or a change in the project schedule.
1. Answered RFIs shall not be construed as approval to perform extra work.
  2. Rejected RFIs will be returned with a stamp or notation: Rejected.
- H. Contractor shall prepare and maintain a log of RFIs, and provide log for review at project meetings and when requested by Owner's Representative or Architect. Contractor shall note unanswered RFIs in the log.
- I. Contractor shall allow seven calendar days to review and respond to RFIs. RFI response time is relative to complexity and number of professionals affected.
1. The Architect will endeavor to respond in a timely fashion to RFIs.
  2. RFI shall state requested date/time for response; however, this requested date/time for response is not a guarantee that the RFI will be answered by that date/time if that date/time is deemed inadequate or insufficient.

1.5 ARCHITECT'S RESPONSE TO RFIs

- A. The Architect and/or Owner's Representative will respond to RFIs on one of the following forms:
  - 1. Properly prepared RFIs:
    - a. Response directly upon RFI form.
    - b. Architect's Supplemental Instruction.
    - c. Request for Proposal.
  - 2. Improper or Frivolous RFIs: Rejected RFIs will be returned with a stamp or notation: Rejected.
  - 3. Answers to properly prepared RFIs may or may not be made directly upon the RFI form as deemed appropriate by the Owner's Representative and/or the Architect.
  
- B. The Owner's Representative and/or the Architect may opt to retain RFIs for discussion during regularly scheduled project meetings for inclusion in discussion with written response as follow-up.

PART 2 - PRODUCTS - (Not Applicable)

PART 3 - EXECUTION - (Not Applicable)

END OF SECTION



**REQUEST FOR INFORMATION / INTERPRETATION**

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Project: Pinal County R.F.I. Number: \_\_\_\_\_  
Pinal County Superior Courts Expansion From: \_\_\_\_\_

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

Fax: \_\_\_\_\_ A/E Project Number: DLR No. 30-15122-00

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Specification Section: \_\_\_\_\_ Paragraph: \_\_\_\_\_ Drawing Reference: \_\_\_\_\_ Detail \_\_\_\_\_

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Request:

\* Requested Date/Time for Response:  
*(The undersigned acknowledges review of Section 01 2613 in its entirety.)*

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

Response:

Attachments

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Response From: \_\_\_\_\_ To: \_\_\_\_\_ \* Date Rec'd: \_\_\_\_\_ \* Date Ret'd: \_\_\_\_\_

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

Copies:  Owner  Contractor  \_\_\_\_\_  \_\_\_\_\_  \_\_\_\_\_  File

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\* Contractor shall allow a reasonable response time for RFIs. (See Section 01 2613.)



SECTION 01 2973 - SCHEDULE OF VALUES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Work Included: Provide detailed Schedule of Value breakdowns, of the agreed Contract Sum, showing values allocated to each of the various parts of the Work, as specified herein and in other provisions of the Contract Documents.
- B. Related Work
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions and Sections in Division 01 of these specifications.
  - 2. Schedule of Values is required by the AIA Agreement.

1.3 QUALITY ASSURANCE

- A. Use required means to assure arithmetical accuracy of the sums described.
- B. When so required by the Architect, provide copies of the subcontracts or other data acceptable to the Architect, substantiating the sums described.

1.4 SUBMITTALS

- A. Schedule of Values shall be submitted as indicated in General and Supplemental Conditions of the Owner General Contractor Contract.

PART 2 - PRODUCTS - (Not Applicable)

PART 3 - EXECUTION - (Not Applicable)

END OF SECTION



SECTION 01 2976 - PROGRESS PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section describes procedures for submitting Applications for Payment.

PART 2 - PRODUCTS - (Not Applicable)

PART 3 - EXECUTION

3.1 GENERAL

- A. Submit pay application including lein wavers in accordance with General and Supplementary Conditions of the AIA Agreement. Approvals shall be made in accordance with Supplementary Conditions.
- B. Provide supporting data substantiating the Contractor's right to payment.
- C. Prior to submitting the pay application for processing the General Contractor will review a draft of the pay application with the Architect for general concurrence prior to the formal submittal.

3.2 APPLICATIONS FOR PAYMENT

- A. Application for payment shall be submitted electronically in .PDF format.

END OF SECTION



## SECTION 01 3119 - PROJECT MEETINGS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 DESCRIPTION

- A. Project Meetings are held to enable an orderly review of the work as it progresses with frequency as indicated in Part 3. It also provides an opportunity for systematic discussion of cost, schedule, problems and solutions. The General Contractor will conduct Owner Architect Contractor (OAC) project meetings throughout the construction period.
- B. Persons designated by the General Contractor to attend and participate in the project meetings shall have all required authority to commit the Contractor to solutions agreed upon in the project meetings.
- C. Unless followed up in writing, verbal authorizations, changes in the Work or acknowledgement of those present are not binding.

#### 1.3 SUBMITTALS

- A. The Construction Manager will compile minutes of each project meeting and will furnish copies to the Owner, Architect, and Engineers. The Contractor may make and distribute such other copies as he wishes. Distribution of meeting minutes shall be a minimum two days prior to the next regularly scheduled meeting.

### PART 2 - PRODUCTS - (Not Applicable)

### PART 3 - EXECUTION

#### 3.1 MEETING SCHEDULE

- A. Except as noted below, the preconstruction meeting will be held at the beginning of each package and project meetings (OACs) will be held as needed or required by Owner. Meeting dates and times will be coordinated in an effort to allow all parties whose participation is essential.

#### 3.2 MEETING LOCATION

- A. To the maximum extent practicable, meetings will be held at the job site.

### 3.3 PRECONSTRUCTION MEETING

- A. The Architect-Engineer and General Contractor will conduct a preconstruction meeting which shall be scheduled at the start of each major trade of work. It will be attended by authorized representatives of the Contractor, all major Subcontractors, the Architect, the Owner, and other interested parties.
- B. Minimum Agenda: Distribute data on, and discuss:
  - 1. Organizational arrangement of Contractor's forces and personnel, personnel of subcontractors, materials suppliers, Architect, and Owner.
  - 2. Channels and procedures for communications.
  - 3. Construction schedule, including sequence of critical work. Contractor shall provide a narrative indicating overall scope of project construction schedule.
  - 4. Contract Documents, including distribution of required copies of original Documents and revisions.
  - 5. Processing of Shop Drawings and other data submitted to the Architect for review.
  - 6. Processing of field decisions and Change Orders.
  - 7. Rules and regulations governing performance of the Work.
  - 8. Procedures and responsibilities regarding Project Record Documents.
  - 9. Procedures and responsibilities regarding operations and maintenance information and training Owner's personnel.
  - 10. Procedures for safety and first aid, security, quality control, housekeeping, and other related matters.
  - 11. Billing procedures.

### 3.4 PRE-INSTALLATION MEETINGS

- A. The General Contractor shall conduct a pre-installation meeting at the site before each construction activity that requires coordination with other construction. The 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. The General Contractor will advise the Architect of scheduled meeting dates.
  - 1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:
    - a. Contract Documents.
    - b. Shop Drawings, Product Data and quality control Samples.
    - c. Compatibility problems.
    - d. Time schedules.
    - e. Weather limitations.
    - f. Manufacturer's recommendations.
    - g. Compatibility of materials.
    - h. Acceptability of substrates.
    - i. Governing regulations.
    - j. Safety.
    - k. Inspection and testing requirements.
    - l. Required performance results.
    - m. Recording requirements.
    - n. Protection.

2. Record significant discussions and agreements and disagreements of each meeting, along with the approved schedule. Distribute the record of the meeting to everyone concerned, promptly, including the Owner and Architect.
3. Do not proceed if the meeting cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the meeting at the earliest feasible date.

### 3.5 PROJECT MEETINGS

- A. The general Contractor shall conduct and record project meetings (OACs) as needed or required by Owner. To the maximum extent practicable, assign the same person or persons to represent the Contractor at project meetings throughout progress of the Work. Subcontractors, materials suppliers, and others may be invited to attend those project meetings in which their aspects of the Work are involved.
- B. Minimum Agenda:
  1. Review, revise as necessary, and approve minutes of previous meeting.
  2. Review progress of the Work since last meeting, including status of submittals for approval.
  3. Present and discuss Contractor's updated three week schedule.
  4. Identify problems which impede planned progress.
  5. Develop corrective measures and procedures to regain planned schedule.
  6. Discuss changes in the work.
  7. Complete other current business.
  8. Review Progress Report.
- C. Meeting Minutes:
  1. Provide meeting minutes within 3 days after meeting.
  2. List all items discussed and organized by status.
  3. Track all items as topics with action items and responsible party with due dates for action.
  4. Identify any items that are critical to the schedule with required decision due dates.

END OF SECTION



SECTION 01 3200 - CONSTRUCTION DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Furnish progress reports as indicated, in accordance with provisions of Contract Documents.

PART 2 - PRODUCTS - (Not Applicable)

PART 3 - EXECUTION

3.1 GENERAL

- A. General Contractor shall prepare a comprehensive daily log and maintain it during entire project period.
- B. General Contractor shall utilize the daily log entries for compilation into monthly Progress Reports. Monthly progress reports are to include photographs of major stages of work, statement of schedule conformance and any outstanding items requiring attention of the team.

3.2 REPORTS

- A. Each Progress Report should include the following data for each day of entire project period.
  1. Manpower, by trade.
  2. Work being performed, with location.
  3. Weather.
  4. Situations or circumstances which could delay work or give cause for claims for extension of time or added cost.
  5. List of visitors' names, to include officials, Owner's representative, and other authorities. Record their observation.
  6. Major equipment utilized.
  7. Safety incidents or reported violations.

END OF SECTION



SECTION 01 3216 - CONSTRUCTION PROGRESS SCHEDULES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

- A. To assure adequate planning and execution of the Work so that the Work is completed by the date allowed in the Contract, and to assist the Owner or his Representative in appraising the reasonableness of the proposed schedule and in evaluating progress of the Work, prepare and maintain the schedules and reports described in this Section.
- B. The General Contractor will employ a scheduler who is thoroughly trained and experienced in compiling construction schedule data, in analyzing and use of Critical Path Method or PERT, and in preparation and issue of periodic reports as required below.
- C. The General Contractor and Architect shall mutually agree on the format of the construction schedule documents.

1.3 RELIANCE UPON APPROVED SCHEDULE

- A. The ultimate responsibility for timely completion of all contract milestones and the completion of the contract shall be that of the General Contractor.
- B. The schedule must accommodate Owner planned activities and a reasonable accommodation of Courts operations.

1.4 PRELIMINARY AND CONSTRUCTION ANALYSIS

- A. The General Contractor shall submit 1 electronic copy in .PDF format.
- B. The construction schedule shall be updated on a monthly basis as a minimum.

## PART 2 - REPORT FORMATS

### 2.1 CONSTRUCTION DIAGRAM

- A. The Schedule or Construction Diagram must be a standard and accepted computer generated schedule of activities that shall graphically show the order and interdependence of all activities necessary to complete the Work, and the sequence in which each activity is to be accomplished, as planned by the General Contractor and the Project Field Superintendent in coordination with all subcontractors whose work is shown on the diagram. Activities shown on the diagram shall include, but are not necessarily limited to:
1. Project mobilization;
  2. Anticipated date of Construction Permit as defined in the Calendar of Events.
  3. Submittals and approvals of shop drawings and samples;
  4. Procurement of equipment and critical materials;
  5. Fabrication of special material and equipment, installation and testing;
  6. Final cleanup;
  7. Final inspection and testing;
  8. All activities determined by the Owner to affect the progress of required dates for completion, for all and for each part of the work.
  9. Project milestones.
- B. The detail of information shall be such that duration times of activities shall normally range from 1 to 25 calendar days. The selection and number of activities shall be subject to Owner approval.
- C. Show on the diagram, as a minimum for each activity, description of each activity, duration in calendar days of each activity, completion of each activity, and how each activity affects each other activity. The diagram shall have the capability of being zoned (i.e. group activities by trade within a designated zone on the page). The diagram shall be available for review by Owner and/or Architect upon request.
- D. The General Contractor shall additionally provide a three-week Bar Chart type schedule attached to project meeting (OAC) minutes. The information shall be detailed by activity and updated weekly to demonstrate work progress from the previous week and for the next two week period. The three-week schedule should be based upon the information contained within the approved Project Schedule. Each activity schedule to be complete during a previous week that is not accomplished shall be explained during the current weekly meeting with solutions for upgrading the activity and/or statements relative to the delays to explain same.
- E. The Critical Path Method or PERT Program shall be capable of producing management reports, such as early start, late finish, total float, etc. These reports, as determined by the Architect, shall be submitted with each update of the schedule.

## PART 3 - CONSTRUCTION STATUS REPORT

### 3.1 CONTENT

- A. Report actual progress by updating the mathematical analysis as indicated below.

- B. Note on the summary report, or clearly show on a revised issue the affected portions of the detailed diagram, all revisions causing changes in the detailed program.
- C. Revise the summary report monthly for continued clarity.
- D. Describe activities or portions of activities completed during the reporting period.
- E. State the percentage of Work actually completed and schedule as of the report date, and the progress along the critical path in terms of days ahead or days behind the scheduled dates.
- F. If the Work is behind schedule, also report progress along other paths with negative float.
- G. Include a narrative report which shows, but is not necessarily limited to:
  - 1. A description of the problem areas, current and anticipated;
  - 2. Delaying factors, and their impact;
  - 3. An explanation of corrective actions taken or proposed.

END OF SECTION



SECTION 01 3323 - SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Submit items to the Architect for review as indicated below.
- B. Scheduling and handling of shop drawings, product data and samples as indicated, in accordance with Contract Documents.
- C. See Technical Sections for items for which data and/or samples are required.
- D. Types of Submittals:
  - 1. Two types of submittals are required for this project: CONFIRMATION NOTICE SUBMITTALS and REGULAR SUBMITTALS.
  - 2. Confirmation Notice Submittals are described in Paragraph 1.6 below.

1.3 SUBMITTALS - GENERAL

- A. Contractor shall be responsible for and make all submissions.
  - 1. Submit items specified herein to Architect.
  - 2. Transmit all items on a shop drawing transmittal form.
  - 3. Identify each transmittal using the 6-digit specification number with a dash and an added number, i.e., metal handrails might be numbered 055000-1. If returned for re-submission, second submission would be 055000-R1. Should submittal be rejected a second time, then the Contractor may be required to reimburse the Owner/Architect for labor to review subsequent submissions.
  - 4. Contractor shall maintain schedule of all submittals and their status. Refer to Paragraph 1.4 below. The schedule will be reviewed each week at the project meeting.
- B. Transmittals, shop drawings, or samples submitted to Architect shall have the Contractor's stamp on it with his signature and be marked "Reviewed." Contractor's stamp on these items indicates that Contractor has performed the following:
  - 1. Verified field dimensions and quantities.
  - 2. Verified field construction criteria, materials, catalog numbers and similar data.
  - 3. Reviewed and coordinated submittal data with requirements of the Work and the Contract Documents.
- C. Make submittals sufficiently in advance of date required to allow Architect reasonable time for review and additional resubmission and review cycles if necessary (14 calendar days).
  - 1. Items submitted without Contractor's review stamp will be returned, without action, for resubmission.

2. Items not submitted in accordance with provisions of this Section will be returned, without action, for resubmission.
3. Submissions on items not approved for use by specifications or addenda will be rejected.
4. Drawings transmitted to the Architect by other than the Prime Contractor will be returned to the Prime Contractor without action of any kind. Drawings will not be returned to subcontractors.

#### 1.4 SCHEDULE

- A. Within 21 calendar days after Notice to Proceed, submit an itemized schedule of submittals broken out by specification section.
  1. Include all shop drawings, data, samples and other items required to be submitted including operations and maintenance data.
  2. This itemized schedule will be Item #1 on the Shop Drawing Log for this Project; it will be reviewed and acknowledged prior to review of any other submittals.
    - a. Architect will review itemized submittal schedule, verifying that all requested submittals are included and that only those requested are included.
    - b. Contractor to include scheduled submittal date and recommended review return date.
- B. Schedule all items requiring Architect action for submission during first 25 percent of construction period.

#### 1.5 PRODUCT LIST

- A. Tabulate by specification section.
- B. Only items which have been specified or approved by addenda may be used.
- C. No partial payment requests per line item will be processed until this data and other submissions required by Contract Documents are received.
- D. For products specified under reference standards, approved equal products, or products of optional manufacturers, include with listing of each product:
  1. Name and address of manufacturer.
  2. Trade name.
  3. Model or catalog designation.
  4. Manufacturer's data.
    - a. Performance and test data.
    - b. Reference standards.

#### 1.6 CONFIRMATION NOTICE SUBMITTAL

- A. Contractor shall provide a letter of confirmation (Confirmation Notice Submittal) in lieu of Product Data and Samples when the following criteria are met for products incorporated in the Work:
  1. Contractor provides exact brand, model number, finish and color specified or indicated on the Drawings or Schedules.
  2. Requests for color, finish or texture samples may be required as indicated in individual Specification Sections.

- B. Shop Drawings shall be submitted when the following conditions occur:
  - 1. Fabrication is required.
  - 2. Installation details and instructions are required in order to achieve proper execution of Work.
  - 3. Contractor has selected an approved manufacturer whose products have not been specified or shown by exact make or model number.
- C. Record relevant information on the Confirmation Notice Submittal. Include Specifications Section article and paragraph number and product manufacturer, name and model number. Include finishes and colors as applicable for products specified.
- D. The Architect will not review items submitted by the Contractor (such as Product Data, etc.) which are submitted for confirmation purposes only.
- E. Full submittals (Product Data, Samples, Reports, and Shop Drawings) are required for specified items which have been discontinued, or which have been materially changed by the manufacturer, since the Contractor's bid was received or contract awarded. This includes, but is not limited to, discontinued finishes or colors.
- F. At the request of the Architect, full submittal may be required for items with critical dimensions or tolerances requiring coordination with other pieces of the Work.

#### 1.7 SUBMITTALS - SHOP DRAWINGS

- A. Identify drawings with manufacturer, item, use, type, project designation, specification section or drawing detail reference.
- B. Submit electronic copies of each drawing until approval is obtained.
  - 1. Marks on drawings by Contractor shall not be in red.
  - 2. Submit drawings 30 x 42 inches when plotted, unless size of items depicted makes such size impractical.
  - 3. Allow clear space of approximately 4 inches by 5 inches for stamping on right hand side.
- C. Submit standard items like equipment brochures, catalog cuts of fixtures, or standard catalog items electronically in standard size when plotted (8.5x11 or 11x17).
  - 1. Indicate exact item or model and all proposed options.
  - 2. Include scale details, sizes, dimensions, performance characteristics, capacities, wiring diagrams, controls and other pertinent data.
- D. Submit a copy of the transmittal letter to the Architect for each submittal and resubmittal.

#### 1.8 SUBMITTALS - SAMPLES

- A. Identify samples with manufacturer's name, item, use, type, project designation, specification section or drawing detail reference, color, range, texture, finish and other pertinent data.
- B. Submit 3 samples to address indicated with transmittal letters, or construction site if required.
  - 1. Include brochures, shop drawings, and installation instructions with transmittal.
  - 2. Submit transmittal for site-built samples to address indicated.
- C. Reviewed samples will be distributed as follows:

1. Architect (1).
  2. Contractor (1 – to remain at site).
  3. Return to subcontractor (1). If subcontractor wishes to have additional samples, they must be provided at time of submission.
- D. Architect shall retain samples as indicated above for comparison purposes until completion of Work.
1. Samples will be returned or may be used in the Work unless the technical section specifically indicates otherwise.
  2. Remove samples when directed.
  3. Pay all costs of furnishing or constructing, and removing samples.
- E. Resubmit samples of rejected items.

#### 1.9 ARCHITECT REVIEW

- A. Reproduce and distribute submittals that the Architect reviews and stamps as follows, to indicate the action taken:
1. Reviewed: Where submittal is marked "Reviewed," 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. Reviewed -- Additional Information Required: Where submittal is marked "Reviewed -- Additional Information Required," the information submitted has been reviewed and approved as noted. However, additional information as noted and/or required by Contract Documents needs to be submitted.
  3. Furnish As Corrected: When submittal is marked "Furnish As Corrected," 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.
  4. Revise and Resubmit: 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.
  5. Rejected: When submittal is marked "Rejected," information submitted is not in compliance with Contract Documents. Resubmit submittal as required by Contract Documents.
- B. Contractor shall retain a copy of each "Reviewed," "Reviewed -- Additional Information Required" or "Furnish as Corrected" submittal on file at jobsite. Contractor shall also returned a copy of reviewed submittal to the respective Subcontractor, supplier, or vendor.
- C. Architect shall retain a copy of each "Reviewed," "Reviewed -- Additional Information Required" or "Furnish as Corrected" submittal in the project file. Architect shall also provide copy of reviewed submittal Owner at Owner's discretion.
- D. Contractor shall resubmit items stamped "Revise and Resubmit" or "Rejected" by Architect.
1. It shall be the Contractor's responsibility to assure that previously "Reviewed" documents are destroyed when they are superseded by a resubmittal.

- E. Architect review is general and does not:
  - 1. Permit departure from Contract Documents.
  - 2. Relieve Contractor from responsibility for errors in detail, in dimensions or related items.
  - 3. Approve departure from previous instructions or details.
  - 4. Relieve Contractor of the responsibility to provide all components, wiring, etc., required to make item operable or usable.
  - 5. Imply acceptance of items for which no data is submitted.
- F. For items constituting a departure from Contract Documents see Section 01 2500 "Substitution Procedures."
- G. Reviewed samples submitted or constructed and approved by Architect constitute criterion for judging completed work. Finish work or items not equal to samples will be rejected.
- H. Start of work which requires submittals, prior to return of submittals with Architect or Owner's stamp indicating review and approval is at Contractor's risk.

#### 1.10 DISTRIBUTION

- A. Contractor shall distribute all "Reviewed," "Reviewed -- Additional Information Required" or "Furnish as Corrected" submittals, as required.

PART 2 - PRODUCTS - (Not Applicable)

PART 3 - EXECUTION - (Not Applicable)

END OF SECTION



SECTION 01 3333 - ELECTRONIC DRAWINGS

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. The Architect-Engineer shall provide the Contractor with one (1) electronic copy of digital data as requested by the Contractor in accordance with the Agreement at no charge. Electronic files of these drawing sheets will be released upon receipt of a signed copy of AIA Document C106-2007.
- B. Electronic files will be provided in AutoCAD 2007.

1.3 REFERENCES

- A. A copy of the AIA Document C106-2007 Digital Licensing Agreement is included at the end of the Section.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION





**AIA**<sup>®</sup>

# Document C106™ – 2007

## Digital Data Licensing Agreement

AGREEMENT made as of the \_\_\_\_\_ day of \_\_\_\_\_ in the year  
Two Thousand and \_\_\_\_\_.  
(In words, indicate day, month and year.)

BETWEEN the Party transmitting Digital Data ("Transmitting Party"):  
(Name, address and contact information, including electronic addresses)

DLR Group inc., an Arizona corporation  
6225 North 24th Street, Suite 250  
Phoenix, AZ 85016-2020

This document has important  
legal consequences. Consultation  
with an attorney  
is encouraged with respect to  
its completion or modification.

and the Party receiving the Digital Data ("Receiving Party"):  
(Name, address and contact information, including electronic addresses)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

for the following Project:  
(Name and location or address)

Pinal County  
Pinal County Superior Courts Expansion  
Florence, Arizona

DLR Group Project No. 30-15122-00

In consideration of the following promises exchanged, the Parties agree as follows:

Init.

TABLE OF ARTICLES

- 1 GENERAL PROVISIONS
- 2 TRANSMISSION OF DIGITAL DATA
- 3 LICENSE CONDITIONS
- 4 LICENSING FEE OR OTHER COMPENSATION

**ARTICLE 1 GENERAL PROVISIONS**

§ 1.1 The purpose of this Agreement is to grant a license from the Transmitting Party to the Receiving Party for the Receiving Party's use of Digital Data on the Project, and to set forth the license terms.

§ 1.2 This Agreement is the entire and integrated agreement between the parties. Except as specifically set forth herein, this agreement does not create any other contractual relationship between the parties.

§ 1.3 Digital Data is defined as information, communications, drawings, or designs created or stored for the Project in digital form.

§ 1.3.1 Confidential Information is defined as Digital Data that the Transmitting Party has designated as confidential and clearly marked with an indication such as "Confidential" or "Business Proprietary."

**ARTICLE 2 TRANSMISSION OF DIGITAL DATA**

§ 2.1 The Transmitting Party grants the Receiving Party a nonexclusive limited license to use the Digital Data solely and exclusively to perform services or construction for the Project in accordance with the conditions set forth in Article 3.

§ 2.2 The transmission of Digital Data constitutes a warranty by the Transmitting Party to the Receiving Party that the Transmitting Party (1) is the copyright owner of the Digital Data, (2) has permission from the copyright owner to transmit the Digital Data and grant a license for its use on the Project, or (3) is authorized to transmit Confidential Information.

§ 2.3 The Transmitting Party retains its rights in the Digital Data. By transmitting the Digital Data, the Transmitting Party does not grant to the Receiving Party an assignment of those rights; nor does the Transmitting Party convey to the Receiving Party any right in the software used to generate the Digital Data.

§ 2.4 To the fullest extent permitted by law, the Receiving Party shall indemnify and defend the Transmitting Party from and against all claims arising from or related to the Receiving Party's modification to, or unlicensed use of, the Digital Data.

§ 2.5 The Receiving Party agrees to keep Confidential Information strictly confidential and not to disclose it to any other person except to ~~(1) its employees,~~ (2) those who need to know the content of the Confidential Information in order to perform services or construction solely and exclusively for the Project, or (3) its consultants and contractors whose contracts include similar restrictions on the use of Confidential Information.

**ARTICLE 3 LICENSE CONDITIONS**

§ 3.1 The parties agree to the following conditions on the limited license granted in Section 2.1:  
*(State below rights or restrictions applicable to the Receiving Party's use of the Digital Data, requirements for data format, transmission method or other conditions on data to be transmitted.)*

Architect-Engineer of Record (AER) makes no representation as to the compatibility of the Computer Aided Drafting/Building Information Model (CAD/BIM) files with any hardware or software.

AER makes no representation regarding the accuracy, completeness, or permanence of CAD/BIM files, nor for their merchantability or fitness for a particular purpose. Addenda information or revisions made after the date indicated on

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User Notes:

(860647278)

the CAD/BIM files may not have been incorporated. In the event of a conflict between the AER's sealed Contract Drawings and CAD/BIM files, the sealed Contract Drawings shall govern. It is the Owner, Contractor, or Third Party's (OCT) responsibility to determine if any conflicts exist. The CAD/BIM files shall not be considered to be Contract Documents as defined by the General Conditions of the Contract for Construction.

The use of CAD/BIM files prepared by the AER shall not in any way obviate the OCT's responsibility for the proper checking and coordination of dimensions, details, member sizes and gage, and quantities of materials as required to facilitate complete and accurate fabrication and erection.

This Agreement shall be governed by the laws of the principal place of business of the AER.

**ARTICLE 4 LICENSING FEE OR OTHER COMPENSATION**

**§ 4.1** The Receiving Party agrees to pay the Transmitting Party the following fee or other compensation ~~There is no charge to the Owner receiving Architect-Engineer generated Digital Data for its internal facility management use.~~

The Transmitting Party agrees to send the Digital Data upon receipt of the fee or other compensation as indicated in Specification Section 013333, Electronic Drawings, for the Receiving Party's use of the Digital Data:

*(State the fee, in dollars, or other method by which the Receiving Party will compensate the Transmitting Party for the Receiving Party's use of the Digital Data.)*

The Transmitting Party will provide the Digital Data, dated \_\_\_\_\_, for the following drawings:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Drawings were prepared on the following:

Computer Software: \_\_\_\_\_ / Version: \_\_\_\_\_.

This Agreement is entered into as of the day and year first written above and will terminate upon Substantial Completion of the Project, as that term is defined in AIA Document A201™-2007, General Conditions of the Contract for Construction, unless otherwise agreed by the parties and set forth below.

*(Indicate when this Agreement will terminate, if other than the date of Substantial Completion.)*

\_\_\_\_\_  
**TRANSMITTING PARTY** *(Signature)*

\_\_\_\_\_  
**RECEIVING PARTY** *(Signature)*

\_\_\_\_\_  
*(Printed name and title)*

\_\_\_\_\_  
*(Printed name and title)*

Init.



SECTION 01 4100 - REGULATORY REQUIREMENTS

PART 1 - GENERAL

1.1 CODES AND ORDINANCES

- A. Application Codes: Compliance with all laws, ordinances and regulations of authorities having jurisdiction is an integral requirement of Contract Documents whether each code is mentioned or not in Contract Documents.
- B. Compliance: Project is designed to comply with the following codes, ordinances and regulations in effect at the time of bid opening including, but not necessarily limited to the following:
  - 1. Arizona Revised Statues, Title 34, Public Buildings and Improvements
  - 2. International Building Code (IBC), 2006 Edition
  - 3. International Mechanical Code (IMC), 2006 Edition
  - 4. Uniform Plumbing Code (UPC), 2006 Edition
  - 5. International Fire Code (IFC), 2012 Edition
  - 6. International Fuel Gas Code (IFCC) 2006
  - 7. Utility Company requirements
  - 8. ANSI 117.1 Standards for Access to the Handicapped
  - 9. ADA Standard for Accessible Design, 2010
  - 10. National Fire Protection Association Standards
  - 11. State and Federal Safety and Health Laws
  - 12. NFPA 70 – National Electrical Code, Latest Edition
  - 13. National Electrical Safety Code (NESC)
  - 14. Arizona Revised Statues, Native Plant Law
  - 15. Arizona Department of Environmental Quality (ADEQ) Air Standards and Maricopa County Air Quality Department of Air Quality Standards
  - 16. Town of Florence Amendments to the above Codes.
- C. Discrepancies: If discrepancies are identified between Contract Documents, local codes, local utility requirements, etc., most stringent requirements shall apply. Provide information on discrepancy to Architect for direction.
- D. Archaeological Features:
  - 1. The attention of the Contractor is directed to Sections 41-771 and 41-772, A.R.S., which makes it a misdemeanor, punishable by a fine not exceeding \$500.00 and imprisonment not exceeding six months, to investigate, explore or excavate, in either federal or state land, in or on prehistoric ruins, ancient burial grounds, fossilized footprints, hieroglyphics and other archaeological features of Arizona without permits from the archaeological branch of the University of Arizona and the County Board of Supervisors.
  - 2. In view of the above, it is a provision of the Contract that when archaeological features are turned up, encountered or unearthed in the excavation of the work, the Contractor shall immediately notify the archaeological branch, University of Arizona and the Owner, by written notice.

3. The Contractor shall give the Owner, in writing, a schedule of dates as to demolition, excavation and trenching. During these operations the Owner may elect to have a field representative on site to observe and investigate the sub-soil conditions and obtain samples of artifacts as necessary.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 4200 - 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. "Reviewed": When used to convey Architect's action on Contractor's submittals, applications, and requests, "reviewed" 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": Unload, temporarily store, unpack, assemble, erect, place, anchor, apply, work to dimension, finish, cure, protect, clean, and similar operations at Project site.
- 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 Gale's "Encyclopedia of Associations: National Organizations of the U.S." or in Columbia Books' "National Trade & Professional Associations of the United States."
- B. Industry Organizations: 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. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
  - 1. AABC - Associated Air Balance Council; [www.aabc.com](http://www.aabc.com).
  - 2. AAMA - American Architectural Manufacturers Association; [www.aamanet.org](http://www.aamanet.org).
  - 3. AAPFCO - Association of American Plant Food Control Officials; [www.aapfco.org](http://www.aapfco.org).
  - 4. AASHTO - American Association of State Highway and Transportation Officials; [www.transportation.org](http://www.transportation.org).
  - 5. AATCC - American Association of Textile Chemists and Colorists; [www.aatcc.org](http://www.aatcc.org).
  - 6. ABMA - American Bearing Manufacturers Association; [www.americanbearings.org](http://www.americanbearings.org).
  - 7. ACI - American Concrete Institute; (Formerly: ACI International); [www.concrete.org](http://www.concrete.org).
  - 8. ACPA - American Concrete Pipe Association; [www.concrete-pipe.org](http://www.concrete-pipe.org).
  - 9. AEIC - Association of Edison Illuminating Companies, Inc. (The); [www.aeic.org](http://www.aeic.org).
  - 10. AF&PA - American Forest & Paper Association; [www.afandpa.org](http://www.afandpa.org).
  - 11. AGA - American Gas Association; [www.aga.org](http://www.aga.org).
  - 12. AHAM - Association of Home Appliance Manufacturers; [www.aham.org](http://www.aham.org).
  - 13. AHRI - Air-Conditioning, Heating, and Refrigeration Institute (The); [www.ahrinet.org](http://www.ahrinet.org).
  - 14. AI - Asphalt Institute; [www.asphaltinstitute.org](http://www.asphaltinstitute.org).
  - 15. AIA - American Institute of Architects (The); [www.aia.org](http://www.aia.org).
  - 16. AISC - American Institute of Steel Construction; [www.aisc.org](http://www.aisc.org).
  - 17. AISI - American Iron and Steel Institute; [www.steel.org](http://www.steel.org).
  - 18. AITC - American Institute of Timber Construction; [www.aitc-glulam.org](http://www.aitc-glulam.org).
  - 19. AMCA - Air Movement and Control Association International, Inc.; [www.amca.org](http://www.amca.org).
  - 20. ANSI - American National Standards Institute; [www.ansi.org](http://www.ansi.org).
  - 21. AOSA - Association of Official Seed Analysts, Inc.; [www.aosaseed.com](http://www.aosaseed.com).
  - 22. APA - APA - The Engineered Wood Association; [www.apawood.org](http://www.apawood.org).
  - 23. APA - Architectural Precast Association; [www.archprecast.org](http://www.archprecast.org).
  - 24. API - American Petroleum Institute; [www.api.org](http://www.api.org).
  - 25. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
  - 26. ARI - American Refrigeration Institute; (See AHRI).
  - 27. ARMA - Asphalt Roofing Manufacturers Association; [www.asphaltroofing.org](http://www.asphaltroofing.org).
  - 28. ASCE - American Society of Civil Engineers; [www.asce.org](http://www.asce.org).

29. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
30. ASHRAE - American Society of Heating, Refrigerating and Air-Conditioning Engineers; [www.ashrae.org](http://www.ashrae.org).
31. ASME - ASME International; (American Society of Mechanical Engineers); [www.asme.org](http://www.asme.org).
32. ASSE - American Society of Safety Engineers (The); [www.asse.org](http://www.asse.org).
33. ASSE - American Society of Sanitary Engineering; [www.asse-plumbing.org](http://www.asse-plumbing.org).
34. ASTM - ASTM International; (American Society for Testing and Materials International); [www.astm.org](http://www.astm.org).
35. ATIS - Alliance for Telecommunications Industry Solutions; [www.atis.org](http://www.atis.org).
36. AWEA - American Wind Energy Association; [www.awea.org](http://www.awea.org).
37. AWI - Architectural Woodwork Institute; [www.awinet.org](http://www.awinet.org).
38. AWMAC - Architectural Woodwork Manufacturers Association of Canada; [www.awmac.com](http://www.awmac.com).
39. AWPA - American Wood Protection Association; (Formerly: American Wood-Preservers' Association); [www.awpa.com](http://www.awpa.com).
40. AWS - American Welding Society; [www.aws.org](http://www.aws.org).
41. AWWA - American Water Works Association; [www.awwa.org](http://www.awwa.org).
42. BHMA - Builders Hardware Manufacturers Association; [www.buildershardware.com](http://www.buildershardware.com).
43. BIA - Brick Industry Association (The); [www.gobrick.com](http://www.gobrick.com).
44. BICSI - BICSI, Inc.; [www.bicsi.org](http://www.bicsi.org).
45. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); [www.bifma.com](http://www.bifma.com).
46. BISSC - Baking Industry Sanitation Standards Committee; [www.bissc.org](http://www.bissc.org).
47. BOCA - BOCA; (Building Officials and Code Administrators International Inc.); (See ICC).
48. BWF - Badminton World Federation; (Formerly: International Badminton Federation); [www.bwfbadminton.org](http://www.bwfbadminton.org).
49. CDA - Copper Development Association; [www.copper.org](http://www.copper.org).
50. CEA - Canadian Electricity Association; [www.electricity.ca](http://www.electricity.ca).
51. CEA - Consumer Electronics Association; [www.ce.org](http://www.ce.org).
52. CFFA - Chemical Fabrics & Film Association, Inc.; [www.chemicalfabricsandfilm.com](http://www.chemicalfabricsandfilm.com).
53. CFSEI - Cold-Formed Steel Engineers Institute; [www.cfsei.org](http://www.cfsei.org).
54. CGA - Compressed Gas Association; [www.cganet.com](http://www.cganet.com).
55. CIMA - Cellulose Insulation Manufacturers Association; [www.cellulose.org](http://www.cellulose.org).
56. CISCA - Ceilings & Interior Systems Construction Association; [www.cisca.org](http://www.cisca.org).
57. CISPI - Cast Iron Soil Pipe Institute; [www.cispi.org](http://www.cispi.org).
58. CLFMI - Chain Link Fence Manufacturers Institute; [www.chainlinkinfo.org](http://www.chainlinkinfo.org).
59. CPA - Composite Panel Association; [www.pbmdf.com](http://www.pbmdf.com).
60. CRI - Carpet and Rug Institute (The); [www.carpet-rug.org](http://www.carpet-rug.org).
61. CRRC - Cool Roof Rating Council; [www.coolroofs.org](http://www.coolroofs.org).
62. CRSI - Concrete Reinforcing Steel Institute; [www.crsi.org](http://www.crsi.org).
63. CSA - Canadian Standards Association; [www.csa.ca](http://www.csa.ca).
64. CSA - CSA International; (Formerly: IAS - International Approval Services); [www.csa-international.org](http://www.csa-international.org).
65. CSI - Construction Specifications Institute (The); [www.csinet.org](http://www.csinet.org).
66. CSSB - Cedar Shake & Shingle Bureau; [www.cedarbureau.org](http://www.cedarbureau.org).
67. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); [www.cti.org](http://www.cti.org).
68. CWC - Composite Wood Council; (See CPA).

69. DASMA - Door and Access Systems Manufacturers Association; [www.dasma.com](http://www.dasma.com).
70. DHI - Door and Hardware Institute; [www.dhi.org](http://www.dhi.org).
71. ECA - Electronic Components Association; [www.ec-central.org](http://www.ec-central.org).
72. ECAMA - Electronic Components Assemblies & Materials Association; (See ECA).
73. EIA - Electronic Industries Alliance; (See TIA).
74. EIMA - EIFS Industry Members Association; [www.eima.com](http://www.eima.com).
75. EJMA - Expansion Joint Manufacturers Association, Inc.; [www.ejma.org](http://www.ejma.org).
76. ESD - ESD Association; (Electrostatic Discharge Association); [www.esda.org](http://www.esda.org).
77. ESTA - Entertainment Services and Technology Association; (See PLASA).
78. EVO - Efficiency Valuation Organization; [www.evo-world.org](http://www.evo-world.org).
79. FIBA - Federation Internationale de Basketball; (The International Basketball Federation); [www.fiba.com](http://www.fiba.com).
80. FIVB - Federation Internationale de Volleyball; (The International Volleyball Federation); [www.fivb.org](http://www.fivb.org).
81. FM Approvals - FM Approvals LLC; [www.fmglobal.com](http://www.fmglobal.com).
82. FM Global - FM Global; (Formerly: FMG - FM Global); [www.fmglobal.com](http://www.fmglobal.com).
83. FRSA - Florida Roofing, Sheet Metal & Air Conditioning Contractors Association, Inc.; [www.floridarooft.com](http://www.floridarooft.com).
84. FSA - Fluid Sealing Association; [www.fluidsealing.com](http://www.fluidsealing.com).
85. FSC - Forest Stewardship Council U.S.; [www.fscus.org](http://www.fscus.org).
86. GA - Gypsum Association; [www.gypsum.org](http://www.gypsum.org).
87. GANA - Glass Association of North America; [www.glasswebsite.com](http://www.glasswebsite.com).
88. GS - Green Seal; [www.greenseal.org](http://www.greenseal.org).
89. HI - Hydraulic Institute; [www.pumps.org](http://www.pumps.org).
90. HI/GAMA - Hydronic Institute/Gas Appliance Manufacturers Association; (See AHRI).
91. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
92. HPVA - Hardwood Plywood & Veneer Association; [www.hpva.org](http://www.hpva.org).
93. HPW - H. P. White Laboratory, Inc.; [www.hpwhite.com](http://www.hpwhite.com).
94. IAPSC - International Association of Professional Security Consultants; [www.iapsc.org](http://www.iapsc.org).
95. IAS - International Approval Services; (See CSA).
96. ICBO - International Conference of Building Officials; (See ICC).
97. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
98. ICEA - Insulated Cable Engineers Association, Inc.; [www.icea.net](http://www.icea.net).
99. ICPA - International Cast Polymer Alliance; [www.icpa-hq.org](http://www.icpa-hq.org).
100. ICRI - International Concrete Repair Institute, Inc.; [www.icri.org](http://www.icri.org).
101. IEC - International Electro technical Commission; [www.iec.ch](http://www.iec.ch).
102. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); [www.ieee.org](http://www.ieee.org).
103. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); [www.ies.org](http://www.ies.org).
104. IESNA - Illuminating Engineering Society of North America; (See IES).
105. IEST - Institute of Environmental Sciences and Technology; [www.iest.org](http://www.iest.org).
106. IGMA - Insulating Glass Manufacturers Alliance; [www.igmaonline.org](http://www.igmaonline.org).
107. IGSHPA - International Ground Source Heat Pump Association; [www.igshpa.okstate.edu](http://www.igshpa.okstate.edu).
108. ILI - Indiana Limestone Institute of America, Inc.; [www.iliai.com](http://www.iliai.com).
109. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); [www.intertek.com](http://www.intertek.com).
110. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); [www.isa.org](http://www.isa.org).
111. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).

112. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); [www.isfanow.org](http://www.isfanow.org).
113. ISO - International Organization for Standardization; [www.iso.org](http://www.iso.org).
114. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
115. ITU - International Telecommunication Union; [www.itu.int/home](http://www.itu.int/home).
116. KCMA - Kitchen Cabinet Manufacturers Association; [www.kcma.org](http://www.kcma.org).
117. LMA - Laminating Materials Association; (See CPA).
118. LPI - Lightning Protection Institute; [www.lightning.org](http://www.lightning.org).
119. MBMA - Metal Building Manufacturers Association; [www.mbma.com](http://www.mbma.com).
120. MCA - Metal Construction Association; [www.metalconstruction.org](http://www.metalconstruction.org).
121. MFMA - Maple Flooring Manufacturers Association, Inc.; [www.maplefloor.org](http://www.maplefloor.org).
122. MFMA - Metal Framing Manufacturers Association, Inc.; [www.metalframingmfg.org](http://www.metalframingmfg.org).
123. MHIA - Material Handling Industry of America; [www.mhia.org](http://www.mhia.org).
124. MIA - Marble Institute of America; [www.marble-institute.com](http://www.marble-institute.com).
125. MMPA - Molding & Millwork Producers Association; (Formerly: Wood Molding & Millwork Producers Association); [www.wmmpa.com](http://www.wmmpa.com).
126. MPI - Master Painters Institute; [www.paintinfo.com](http://www.paintinfo.com).
127. MSS - Manufacturers Standardization Society of The Valve and Fittings Industry Inc.; [www.mss-hq.org](http://www.mss-hq.org).
128. NAAMM - National Association of Architectural Metal Manufacturers; [www.naamm.org](http://www.naamm.org).
129. NACE - NACE International; (National Association of Corrosion Engineers International); [www.nace.org](http://www.nace.org).
130. NADCA - National Air Duct Cleaners Association; [www.nadca.com](http://www.nadca.com).
131. NAIMA - North American Insulation Manufacturers Association; [www.naima.org](http://www.naima.org).
132. NBGQA - National Building Granite Quarries Association, Inc.; [www.nbgqa.com](http://www.nbgqa.com).
133. NCAA - National Collegiate Athletic Association (The); [www.ncaa.org](http://www.ncaa.org).
134. NCMA - National Concrete Masonry Association; [www.ncma.org](http://www.ncma.org).
135. NEBB - National Environmental Balancing Bureau; [www.nebb.org](http://www.nebb.org).
136. NECA - National Electrical Contractors Association; [www.necanet.org](http://www.necanet.org).
137. NeLMA - Northeastern Lumber Manufacturers Association; [www.nelma.org](http://www.nelma.org).
138. NEMA - National Electrical Manufacturers Association; [www.nema.org](http://www.nema.org).
139. NETA - International Electrical Testing Association; [www.netaworld.org](http://www.netaworld.org).
140. NFHS - National Federation of State High School Associations; [www.nfhs.org](http://www.nfhs.org).
141. NFPA - NFPA; (National Fire Protection Association); [www.nfpa.org](http://www.nfpa.org).
142. NFPA - NFPA International; (See NFPA).
143. NFRC - National Fenestration Rating Council; [www.nfrc.org](http://www.nfrc.org).
144. NHLA - National Hardwood Lumber Association; [www.nhla.com](http://www.nhla.com).
145. NLGA - National Lumber Grades Authority; [www.nlga.org](http://www.nlga.org).
146. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
147. NOMMA - National Ornamental & Miscellaneous Metals Association; [www.nomma.org](http://www.nomma.org).
148. NRCA - National Roofing Contractors Association; [www.nrca.net](http://www.nrca.net).
149. NRMCA - National Ready Mixed Concrete Association; [www.nrmca.org](http://www.nrmca.org).
150. NSF - NSF International; (National Sanitation Foundation International); [www.nsf.org](http://www.nsf.org).
151. NSPE - National Society of Professional Engineers; [www.nspe.org](http://www.nspe.org).
152. NSSGA - National Stone, Sand & Gravel Association; [www.nssga.org](http://www.nssga.org).
153. NTMA - National Terrazzo & Mosaic Association, Inc. (The); [www.ntma.com](http://www.ntma.com).
154. NWFA - National Wood Flooring Association; [www.nwfa.org](http://www.nwfa.org).
155. PCI - Precast/Prestressed Concrete Institute; [www.pci.org](http://www.pci.org).
156. PDI - Plumbing & Drainage Institute; [www.pdionline.org](http://www.pdionline.org).

157. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); [www.plasa.org](http://www.plasa.org).
158. RCSC - Research Council on Structural Connections; [www.boltcouncil.org](http://www.boltcouncil.org).
159. RFCI - Resilient Floor Covering Institute; [www.rfci.com](http://www.rfci.com).
160. RIS - Redwood Inspection Service; [www.redwoodinspection.com](http://www.redwoodinspection.com).
161. SAE - SAE International; (Society of Automotive Engineers); [www.sae.org](http://www.sae.org).
162. SCTE - Society of Cable Telecommunications Engineers; [www.scte.org](http://www.scte.org).
163. SDI - Steel Deck Institute; [www.sdi.org](http://www.sdi.org).
164. SDI - Steel Door Institute; [www.steeldoor.org](http://www.steeldoor.org).
165. SEFA - Scientific Equipment and Furniture Association; [www.sefalabs.com](http://www.sefalabs.com).
166. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
167. SIA - Security Industry Association; [www.siaonline.org](http://www.siaonline.org).
168. SJI - Steel Joist Institute; [www.steeljoist.org](http://www.steeljoist.org).
169. SMA - Screen Manufacturers Association; [www.smainfo.org](http://www.smainfo.org).
170. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; [www.smacna.org](http://www.smacna.org).
171. SMPTE - Society of Motion Picture and Television Engineers; [www.smpte.org](http://www.smpte.org).
172. SPFA - Spray Polyurethane Foam Alliance; [www.sprayfoam.org](http://www.sprayfoam.org).
173. SPIB - Southern Pine Inspection Bureau; [www.spib.org](http://www.spib.org).
174. SPRI - Single Ply Roofing Industry; [www.spri.org](http://www.spri.org).
175. SRCC - Solar Rating and Certification Corporation; [www.solar-rating.org](http://www.solar-rating.org).
176. SSINA - Specialty Steel Industry of North America; [www.ssina.com](http://www.ssina.com).
177. SSPC - SSPC: The Society for Protective Coatings; [www.sspc.org](http://www.sspc.org).
178. STI - Steel Tank Institute; [www.steeltank.com](http://www.steeltank.com).
179. SWI - Steel Window Institute; [www.steelwindows.com](http://www.steelwindows.com).
180. SWPA - Submersible Wastewater Pump Association; [www.swpa.org](http://www.swpa.org).
181. TCA - Tilt-Up Concrete Association; [www.tilt-up.org](http://www.tilt-up.org).
182. TCNA - Tile Council of North America, Inc.; (Formerly: Tile Council of America); [www.tileusa.com](http://www.tileusa.com).
183. TEMA - Tubular Exchanger Manufacturers Association, Inc.; [www.tema.org](http://www.tema.org).
184. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); [www.tiaonline.org](http://www.tiaonline.org).
185. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).
186. TMS - The Masonry Society; [www.masonrysociety.org](http://www.masonrysociety.org).
187. TPI - Truss Plate Institute; [www.tpinst.org](http://www.tpinst.org).
188. TPI - Turfgrass Producers International; [www.turfgrasssod.org](http://www.turfgrasssod.org).
189. TRI - Tile Roofing Institute; [www.tilerroofing.org](http://www.tilerroofing.org).
190. UBC - Uniform Building Code; (See ICC).
191. UL - Underwriters Laboratories Inc.; [www.ul.com](http://www.ul.com).
192. UNI - Uni-Bell PVC Pipe Association; [www.uni-bell.org](http://www.uni-bell.org).
193. USAV - USA Volleyball; [www.usavolleyball.org](http://www.usavolleyball.org).
194. USGBC - U.S. Green Building Council; [www.usgbc.org](http://www.usgbc.org).
195. USITT - United States Institute for Theatre Technology, Inc.; [www.usitt.org](http://www.usitt.org).
196. WASTEC - Waste Equipment Technology Association; [www.wastec.org](http://www.wastec.org).
197. WCLIB - West Coast Lumber Inspection Bureau; [www.wclib.org](http://www.wclib.org).
198. WCMA - Window Covering Manufacturers Association; [www.wcmanet.org](http://www.wcmanet.org).
199. WDMA - Window & Door Manufacturers Association; [www.wdma.com](http://www.wdma.com).

200. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); [www.wicnet.org](http://www.wicnet.org).
  201. WMMPA - Wood Molding & Millwork Producers Association; (See MMPA).
  202. WSRCA - Western States Roofing Contractors Association; [www.wsrca.com](http://www.wsrca.com).
  203. WPA - Western Wood Products Association; [www.wvpa.org](http://www.wvpa.org).
- C. 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. This information is believed to be accurate as of the date of the Contract Documents.
1. DIN - Deutsches Institut fur Normung e.V.; [www.din.de](http://www.din.de).
  2. IAPMO - International Association of Plumbing and Mechanical Officials; [www.iapmo.org](http://www.iapmo.org).
  3. ICC - International Code Council; [www.iccsafe.org](http://www.iccsafe.org).
  4. ICC-ES - ICC Evaluation Service, LLC; [www.icc-es.org](http://www.icc-es.org).
- D. Federal Government 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. Information is subject to change and is up-to-date as of the date of the Contract Documents.
1. COE - Army Corps of Engineers; [www.usace.army.mil](http://www.usace.army.mil).
  2. CPSC - Consumer Product Safety Commission; [www.cpsc.gov](http://www.cpsc.gov).
  3. DOC - Department of Commerce; National Institute of Standards and Technology; [www.nist.gov](http://www.nist.gov).
  4. DOD - Department of Defense; <http://dodssp.daps.dla.mil>.
  5. DOE - Department of Energy; [www.energy.gov](http://www.energy.gov).
  6. EPA - Environmental Protection Agency; [www.epa.gov](http://www.epa.gov).
  7. FAA - Federal Aviation Administration; [www.faa.gov](http://www.faa.gov).
  8. FG - Federal Government Publications; [www.gpo.gov](http://www.gpo.gov).
  9. GSA - General Services Administration; [www.gsa.gov](http://www.gsa.gov).
  10. HUD - Department of Housing and Urban Development; [www.hud.gov](http://www.hud.gov).
  11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; <http://eetd.lbl.gov>.
  12. OSHA - Occupational Safety & Health Administration; [www.osha.gov](http://www.osha.gov).
  13. SD - Department of State; [www.state.gov](http://www.state.gov).
  14. TRB - Transportation Research Board; National Cooperative Highway Research Program; [www.trb.org](http://www.trb.org).
  15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; [www.ars.usda.gov](http://www.ars.usda.gov).
  16. USDA - Department of Agriculture; Rural Utilities Service; [www.usda.gov](http://www.usda.gov).
  17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; [www.ojp.usdoj.gov](http://www.ojp.usdoj.gov).
  18. USP - U.S. Pharmacopeia; [www.usp.org](http://www.usp.org).
  19. USPS - United States Postal Service; [www.usps.com](http://www.usps.com).
- E. Standards and Regulations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the standards and regulations in the following list. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. CFR - Code of Federal Regulations; Available from Government Printing Office; [www.gpo.gov/fdsys](http://www.gpo.gov/fdsys).

2. DOD - Department of Defense; Military Specifications and Standards; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
  3. DSCC - Defense Supply Center Columbus; (See FS).
  4. FED-STD - Federal Standard; (See FS).
  5. FS - Federal Specification; Available from Department of Defense Single Stock Point; <http://dodssp.daps.dla.mil>.
    - a. Available from Defense Standardization Program; [www.dsp.dla.mil](http://www.dsp.dla.mil).
    - b. Available from General Services Administration; [www.gsa.gov](http://www.gsa.gov).
    - c. Available from National Institute of Building Sciences/Whole Building Design Guide; [www.wbdg.org/ccb](http://www.wbdg.org/ccb).
  6. MILSPEC - Military Specification and Standards; (See DOD).
  7. USAB - United States Access Board; [www.access-board.gov](http://www.access-board.gov).
  8. USATBCB - U.S. Architectural & Transportation Barriers Compliance Board; (See USAB).
- F. State Government 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. This information is subject to change and is believed to be accurate as of the date of the Contract Documents.
1. AZDEQ - State of Arizona Department of Environmental Quality; [www.azdeq.gov](http://www.azdeq.gov); (602) 771-2300.
  2. CBHF - State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; [www.bearhfti.ca.gov](http://www.bearhfti.ca.gov).
  3. CCR - California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; [www.calregs.com](http://www.calregs.com).
  4. CDHS - California Department of Health Services; (See CDPH).
  5. CDPH - California Department of Public Health; Indoor Air Quality Program; [www.cal-iaq.org](http://www.cal-iaq.org).
  6. CPUC - California Public Utilities Commission; [www.cpuc.ca.gov](http://www.cpuc.ca.gov).
  7. SCAQMD - South Coast Air Quality Management District; [www.aqmd.gov](http://www.aqmd.gov).
  8. TFS - Texas Forest Service; Forest Resource Development and Sustainable Forestry; <http://txforests-service.tamu.edu>.
- G. Local Government 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.
1. Pinal County Air Quality Control District, P.O. Box 987, Florence, AZ 85232; (520) 866-6929.
  2. FCD - Flood Control District of Maricopa County; [www.fcd.maricopa.gov](http://www.fcd.maricopa.gov); (602) 506-1501.
  3. MAG - Maricopa Association of Governments; [www.mag.maricopa.gov](http://www.mag.maricopa.gov); (602) 254-6300.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

## SECTION 01 4500 - QUALITY CONTROL

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 QUALITY ASSURANCE

- A. Codes and Standard: Testing, when and where required, will be in accordance with pertinent codes and regulations and with selected standards of the American Society for Testing and Materials.

#### 1.3 SPECIAL INSPECTION

- A. The Special Inspector shall be a person qualified, certified and licensed to inspect the particular type of construction or operation requiring special inspection. He shall demonstrate his competence to the satisfaction of the State of Arizona and the agency requiring such special inspection.
- B. Inspection by the Special Inspector shall in no way relieve the Contractor of his obligation to perform the Work in accordance with the requirements of the Contract Documents.
- C. Special Inspectors shall observe the work for conformance with the Drawings and Specifications and in accordance with the applicable provisions of applicable building code as identified in Section 01 4100 "Regulatory Requirements."

#### 1.4 NOTIFICATION

- A. Notification of testing laboratory that materials are ready for sampling shall be made by the Contractor. In the case of soil testing, such notification shall be made at least 24 hours in advance.
- B. Notification of Special Inspector shall be made by the Contractor 24 hours prior to the expected time for operations requiring special inspection.

#### 1.5 SAMPLING

- A. Specimens and samples for testing, unless otherwise provided in the Contract Documents, will be taken by the testing personnel. Sampling equipment and personnel will be provided by the testing laboratory. Deliveries of specimens and samples to the testing laboratory will be performed by the testing laboratory.

## 1.6 REPORTS

- A. The testing lab will promptly process and distribute required copies of test reports and related instructions to ensure necessary retesting and replacement of materials with the least possible delay.
1. Retests of all work shall be specifically indicated by the term "Retest" and shall be sufficiently descriptive to designate the date, location, and original test information indicating why the original was not in compliance with documents.
- B. The testing laboratory shall distribute copies of reports as follows:
1. 2 copies to the Architect
  2. 1 copy to the Structural Engineer
  3. 2 copies to the Contractor
  4. 1 copy to the Owner
  5. Code authorities or authorities having jurisdiction.
- C. Special Inspection Reports. Within twenty-four (24) hours after each special inspection, submit one (1) copy of inspection reports to the Contractor, Architect, and building official. Include the following:
- Date Issued
  - Project Title and Number
  - Name of Inspector
  - Date and Time of Inspection
  - Identification of Specifications Section
  - Location in the Project
  - Type of Inspection or Test
  - Date of Test
  - Results of Tests and conformance with Contract Documents
1. All Discrepancies shall be noted and brought to the attention of the Contractor for correction. If corrections are not made, notify the Architect and Town of Buckeye Building Official.
- D. Final Special Inspection Reports shall be signed and submitted by the special inspector, and shall state whether the work requiring special inspection was, to the best of his knowledge, in conformance with the approved Drawings and Specifications and the applicable workmanship provisions of the International Building Code 2006.

## PART 2 - TESTING AND INSPECTION

### 2.1 TESTS

- A. Tests are specified in the following Sections:
- 03 3000 Cast-In-Place Concrete
  - 03 4100 Precast Structural Concrete
  - 04 2200 Concrete Unit Masonry and Grout
  - 13 3480 Precast Concrete Modules
  - 21 1313 Wet-Pipe Sprinkler Systems
  - 23 0593 Testing, Adjusting, and Balancing for HVAC
  - 23 0993 Sequence of Operations for HVAC Controls

28 3111 Digital Addressable Fire Alarm System

## 2.2 SPECIAL INSPECTIONS

- A. Special inspections are generally specified in the following Sections, and shall be performed by the indicated party: ( the list of special inspections is not all inclusive and is governed by the regulatory agency and the authority having jurisdiction. The Contractor will provide all special inspections as required.

03 3000 Cast-In-Place Concrete  
03 4100 Precast Structural Concrete  
04 2200 Concrete Unit Masonry  
07 8400 Firestopping  
13 3480 Precast Concrete Modules  
05 4100 Structural Precast Concrete  
05 1200 Structural Steel  
Division 21  
Division 22  
Division 23  
Division 26  
Division 28

## 2.3 PATCHING

- A. Patching, if required by the taking of samples, shall be made by the Contractor.

## PART 3 - PAYMENT FOR TESTING

### 3.1 INITIAL SERVICES

- A. The Owner will contract separately for a third party certified materials testing and special inspection company and will pay for material testing and all special inspection services required by the Documents, agencies and authority having jurisdiction.
- B. The Contractor shall coordinate directly with the testing and special inspections agency for Work required to be tested/inspected. Contractor shall schedule testing and special inspections site visits to greatest extent possible. If quantity of trips for testing and special inspections become excessive due to Contractor lack of coordination and/or scheduling, Owner reserves the right to backcharge Contractor for excessive site visits.
- C. When initial tests indicate noncompliance with the Contract Documents, all subsequent retesting occasioned by the noncompliance shall be performed by the same testing agency and the cost thereof will be the responsibility of the Contractor.

END OF SECTION



## SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Work Included: All labor, material, equipment and services necessary to furnish, erect and maintain temporary facilities and controls and perform temporary work required in the performance of the Contract, including those indicated and specified. The Drawings identify materials storage areas allocated to the Contractor for the Work, and he shall limit his storage and office operations to the defined areas.
- B. Maintenance and Removal: Maintain temporary facilities and controls in a clean, proper, safe operating and sanitary condition for the duration of the Contract. Upon completion of the Contract, remove all temporary facilities and controls from the premises.

#### 1.3 UTILITIES

- A. Electric power as required for the Contractor's use shall be provided and paid for by the Contractor.
  - 1. Electrical subcontractor will make arrangements for and install all equipment, poles, wiring, switches, outlets, etc., to provide power and necessary step down transformers for power for all lighting and power requirements for construction purposes.
    - a. At such time as permanent building power distribution system is utilized, this system may be utilized.
    - b. Remove all temporary electrical equipment, poles, wiring, switches, outlets, etc. when no longer needed.
    - c. At completion of Work, remove and replace all parts of permanent systems damaged.
- B. Subcontractors will make all arrangements; install equipment, piping, and outlets for an adequate supply of clean water for construction purposes.
- C. The Owner will pay for all water costs associated with construction, all in-place building use and all landscape irrigation.

#### 1.4 TOILET FACILITIES

- A. General Contractor will provide temporary toilet facilities for use of all workmen and enforce their use by all personnel.
  - 1. Provide facilities complying with local and State sanitary laws and OSHA regulations.
  - 2. Maintain in clean, sanitary condition.
  - 3. Provide adequate supplies of toilet paper.

1.5 ACCESSIBILITY OF VALVES AND CONTROLS

- A. No equipment that has to be operated or maintained, such as valves, traps, controls, unions, motors, etc., shall be placed in an inaccessible location.
  - 1. Temporary fencing shall have no barbed wire components.
  - 2. Temporary fencing must have adequate contrast for the safety of the visually impaired – contrast may be achieved through color variation panels, signage or other means as approved by the Owner.

1.6 FIRE PROTECTION

- A. Provide adequate fire extinguishers on the premises during the course of construction, of the type and sizes recommended by the NFPA, State Fire Marshal and the 2012 International Fire Code to control fires resulting from the particular work being performed and instruct employees in their use. Place extinguishers in the immediate vicinity of the work being performed, ready for instant use. In the use of especially hazardous types of equipment, such as acetylene torches, welding equipment, etc., no work shall be commenced or equipment used unless fire extinguishers of approved type and capacity are placed in the working area available for immediate use by the workman using the above-mentioned equipment.

1.7 TEMPORARY ENCLOSURES, BARRIERS AND FENCES

- A. The existing Courthouse is a secure facility. All persons, supplies, materials, etc. are searched for anything that may be a weapon or used as a weapon. The Contractor will maintain a substantially secure continuous barrier between the existing Court facility envelope and the new construction at all times. At times when this secure barrier must be breached, security staff will be notified to be present. During construction inside the secure perimeter of the Courthouse the Contractor will utilize personnel that have been previously badged for access as a contractor in the courthouse. As such these construction personnel will keep a detailed inventory of all tools, material etc. brought into the facility and the same that exits the facility. Any violation of these requirements or potential security breach is subject to criminal charges and removal from the project.
- B. Provide and maintain all chain link fences, barricades, lights, shoring and other protective structures or devices necessary for the safety of workman, equipment, the public and property as required by State or municipal laws and regulations, local ordinances, laws and other requirements of the Town of Florence, Pinal County, State, and other authorities having jurisdiction with regard to safety precautions, operation and fire hazards.
- C. Provide and maintain pumping facilities, including power, for keeping the site, excavations and structure free from accumulations of water at all times, whether from underground seepage, rainfall, drainage or broken line.

## 1.8 EXISTING SITE PROTECTION

- A. Existing or newly established sidewalks, paving, etc., on the site (including the site areas in the overhead transmission easements), shall, unless directly affected by the Work of this Contract, be protected against damage of any kind. Work, storage and traffic areas shall be restricted to those areas immediately adjacent to the construction site as outlined in the contract documents. Damage of any kind caused by the Work of this Contract shall be replaced before final acceptance of the Project. The Contractor shall provide protection barricades as required to maintain all site improvements, whether new or designated to remain.

## 1.9 NOISE, DEBRIS AND DUST CONTROL

- A. Construction work will be adjacent to an active operational courthouse as such noise is a major factor in disrupting the operations of the Courts. The Contractor will work closely with the County and Courts to minimize the activities that will disrupt the courts operations. The Contractor may need to conduct noisy activities during non-courts business hours or as acceptable with the Courts. In addition there will be some work conducted within the existing courthouse. This work will need to be closely coordinated with court staff to minimize disruption of operations.
- B. Exercise all possible care to control excessive noise and dust during the construction to keep these problems to a minimum. Traffic or construction areas shall be sprinkled with water or chemicals as required by the Owner and in accordance with applicable Town of Florence and Pinal County requirements.
- C. All debris, etc., shall be removed from all pipe, pipe chases or other such remote and hidden spaces prior to closing of said space.

## 1.10 FIELD OFFICE, STORAGE ENCLOSURES

- A. Provide suitable temporary office space for use by the Contractor, Owner and Architect complete with telephone, data outlet (connection to internet), and furnishings, required for the Contractor's administration of the Work in such locations as approved by the Owner. A office space shall be dedicated for use of Owner and Architect.
  - 1. Temporary office facilities shall include the following:
    - a. Desk and chair.
    - b. Guest chairs (2).
    - c. Lockable file cabinet.
    - d. Bookshelf (3 feet long minimum).
    - e. Small plans table (2x4).
    - f. First Aid Supplies: Comply with governing regulations and recognized recommendations within the construction industry. Provide a sign on office structure to identify "Emergency First Aid."
    - g. Protective Headgear: For visitors' use, 4 clean, adjustable band helmets.
    - h. Fire Extinguisher: Provide size, number and type of fire extinguisher required by local fire marshal for office and storage areas.
    - i. Toilet and lavatory restroom facility with running water.

Upon completion of the Project, remove temporary offices and storage facilities, and leave premises in conditions required by the Contract.

- B. Contractor shall provide all storage enclosures required for his operations.
  - 1. The Contractor shall furnish and install temporary enclosures, doors and transparent plastic windows required to protect building from damage due to vandalism, or the elements, or to maintain suitable temperature during installation or finishing work.
- C. Provide all items required to ensure safety of individuals on site.

#### 1.11 STAGING AREAS

- A. Staging of construction materials and activities shall be performed at location(s) as agreed to by Owner.

#### 1.12 TEMPORARY SIGNS

- A. Signs of Contractors and Subcontractors. Subject to prior approval by the Owner as to size, design, type, location, and local regulations, the Contractor and his Subcontractors may erect temporary signs for purpose of identification and controlling traffic. The Contractor shall furnish, erect, and maintain such signs required by safety regulations and necessary to safeguard life and property.
- B. Project Sign shall be furnished and erected by the Contractor as directed by the Architect.
  - 1. Post no other signs on site except as noted, those required by law, and/or those approved by Owner.
  - 2. Upon completion of the Work, or sooner if directed, remove project signs.
  - 3. Provide a painted sign with imagery, project name, owners name, supervisors names, project manager, architect and other information as indicated in Drawings.
  - 4. The location of the sign as directed by the architect.

#### 1.13 ACCESS TO PROJECT SITE

- A. Authorized representatives of the Owner (and representative of the Government Agency involved, and Arizona State Industrial Commission) shall have ready access to project at all times.

END OF SECTION

SECTION 01 7123 - FIELD ENGINEERING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section describes requirements for verifying, establishing, and maintaining construction grades, lines, levels, and monuments as indicated within the Contract Documents.

1.3 GENERAL

- A. The Contractor shall, before commencing Work, verify all grades, lines, levels, and existing building dimensions indicated and report any errors or inconsistencies to the Architect. The Contractor shall not proceed until such errors or inconsistencies are corrected or meet Architect modified requirements.
- B. Provide construction staking and surveying from base lines, grades, and benchmarks shown on the plans. Under no circumstances will the Contractor be granted a time extension to this contract due to the lack of construction survey information. Any discrepancies in design of base lines and grades revealed in construction operations shall be brought to the Architect's attention immediately for correction or clarification.
- C. The Contractor shall establish and maintain all construction grades, lines, levels, and benchmarks and shall be responsible for the accuracy and protection of the same. Protect all temporary benchmarks and maintain them in place for the duration of the Contract or until such time as their removal does not affect completion of the Project.
- D. Do not remove any property line markers or monuments or data established by the Owner. If such are damaged or removed, the Contractor shall bear cost of replacement.
- E. The Contractor shall provide the Owner at the end of the Project, as-built documents all underground utilities as part of this Project as indicated in Section 01 7839 "Project Record Documents."

PART 2 - PRODUCTS - (Not Applicable)

PART 3 - EXECUTION - (Not Applicable)

END OF SECTION



## SECTION 01 7329 - CUTTING AND PATCHING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Work Included: This Section establishes general requirements pertaining to cutting, fitting, and patching of the Work required to:
  1. Make the several parts fit properly.
  2. Uncover Work to provide for installation, inspection, or both of ill-timed Work.
  3. Remove and replace Work not conforming to requirements of the Contract Documents.
  4. Remove and replace defective Work.

#### 1.3 QUALITY ASSURANCE

- A. Perform all cutting and patching in accordance with pertinent requirements of the Specifications and in the event no such requirements are determined, in conformance with the Architect's written direction.
- B. In all cases, exercise extreme care in cutting operations and perform such operations under adequate supervision by competent mechanics skilled in the applicable trade. Openings shall be neatly cut and shall be kept as small as possible to avoid unnecessary damage. Careless and/or avoidable cutting damage, etc., will not be tolerated, and the Contractor will be held responsible for such avoidable or willful damage.
- C. All replacing, patching, and repairing of materials and surfaces cut or damaged in the execution of the work shall be performed by experienced mechanics of the several trades involved. Such replacing, repairing, and/or patching shall be done with the applicable materials, in such a manner that all surfaces so replaced, etc., will upon completion of the work, match the surrounding similar surfaces.

#### 1.4 SUBMITTALS

- A. Request for the Architect's Consent:
  1. Prior to cutting which affects structural safety, submit a written request to the Architect for permission to proceed with cutting.
  2. Should conditions of the work, or schedule, indicate a required change of materials or methods for cutting and patching, notify the Architect and secure his written permission prior to proceeding.
- B. Notices to the Architect:
  1. Submit written notice to the Architect designating the time the Work will be uncovered, therefore providing a time for the Architect's observation.

PART 2 - PRODUCTS

2.1 MATERIALS

- A. For replacement of Work removed, use materials which comply with the pertinent Section of these Specifications.

PART 3 - EXECUTION

3.1 CONDITIONS

- A. Inspect existing conditions, including elements subject to movement or damage during cutting and patching.
- B. After uncovering the Work, inspect conditions affecting installation of new Work.

3.2 DISCREPANCIES

- A. If uncovered conditions are not as anticipated, immediately notify the Architect and secure needed directions.
- B. Do not proceed in areas of discrepancy until all such discrepancies have been fully resolved.

3.3 PREPARATION PRIOR TO CUTTING

- A. Provide all required protection including, but not necessarily limited to, shoring, bracing, and support to maintain structural integrity of the Work.

3.4 PERFORMANCE

- A. Perform cutting and demolition by methods which will prevent damage to other portions of the Work and will provide a proper surface to receive new installation or repair and new Work. Perform fitting and adjustment of products to provide finished installation complying with the specified tolerance and finishes. Coordinate all demolition activities with the Owner Representative at least 1 week prior to work.

END OF SECTION

SECTION 01 7419 - 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.
- B. The following related resource documents are attached in the appendices:
  - 1. Recycling Evaluation Tools.
  - 2. Construction Waste Management Appendix.

1.2 PRECONSTRUCTION AND PREBID MEETINGS

- A. The Pre-bid Conference and Preconstruction Conference will include discussion of construction waste management requirements. Prior to the commencement of the Work, the General Contractor should schedule and conduct a meeting with the Owner and Architect to discuss the proposed Construction Waste Management Plan to develop a mutual understanding regarding details of construction waste management implementation.

1.3 WASTE MANAGEMENT GOALS

- A. The recycling goal (including reuse) to be achieved at Substantial Completion of the Project shall be at least 75 percent by weight or volume of total waste generated by the Project and includes reuse.
- B. Reduce: The Project shall generate the least amount of waste and methods shall be used that minimize waste due to error, poor planning, breakage, mishandling, contamination, or similar factors. Promote the resourceful use of materials to the greatest extent possible.
- C. Reuse: All Prime Contractors and Subcontractors shall reuse materials to the greatest extent possible. Salvage reusable materials for resale, for reuse on this Project, or for storage for use on future projects. Return reusable items (e.g., pallets or unused products) to the material suppliers.
- D. Recycle: As many of the waste materials not able to be eliminated in the first place or salvaged for reuse shall be recycled. Waste disposal in landfills shall be minimized to greatest extent possible.

1.4 SUBMITTALS

- A. Construction Waste Management Plan: Prior to commencing demolition or construction activities, the General Contractor, with input from all Subcontractors, shall develop and submit

a Construction Waste Management Plan for review within 15 working days after receiving written approval of bid or prior to any waste removal.

- B. Summary of Waste Final Documentation: At Substantial Completion of the Project, the General Contractor shall submit a final summary of reuse and recycling results for all Subcontractors, including the quantity of each material recycled, reused, or salvaged, the receiving party and the applicable diversion rates.

## 1.5 CONSTRUCTION WASTE MANAGEMENT PLAN

- A. The purpose of the Construction Waste Management Plan is to achieve successful reuse and recycling with the highest possible reuse and recycling rates. The Plan shall include the following:
1. A schedule identifying milestones of Construction Waste Management.
  2. A list of waste materials expected to be generated from the Project as debris.
  3. A list of each material proposed to be salvaged, reused, recycled and discarded. Identify applicable markets for reuse and/or recycling. At a minimum, all materials required by State law to be recycled shall be recycled (e.g., cardboard, cans, bottles, office paper, fluorescent tubes, refrigerants, mercury, etc.) and scrap metal shall be recycled.
  4. Separation and Materials Handling Procedures: Description of how waste materials identified above will be separated, cleaned (if necessary) and protected from contamination.
  5. Educational and Motivational Procedures: Meetings to be held and other proposed methods for educating construction personnel regarding waste reduction and recycling.
  6. Waste Auditing Procedures: Methods of monitoring and enforcing the Plan.
  7. The General Contractor shall distribute copies of the Construction Waste Management Plan to Owner's Representative and the Architect.

## PART 2 - PRODUCTS - (Not Applicable)

## PART 3 - EXECUTION

### 3.1 CONSTRUCTION WASTE MANAGEMENT PLAN IMPLEMENTATION

- A. The General Contractor shall be responsible for coordinating the separation, handling, recycling, salvage, reuse, and return methods to be used by all construction personnel. The General Contractor shall be responsible for reporting the results of the Construction Waste Management Plan.
- B. Instruction: The General Contractor shall provide on-site instruction regarding appropriate separation, handling, recycling, salvage, reuse, and return methods to be used by all construction personnel throughout the duration of the Project.
- C. Separation Facilities: The General Contractor shall lay out and identify a specific area on the Project site for separating materials for recycling, salvage, reuse, and return. The General

Contractor shall provide waste bins and shall keep these bins & the recycling area neat, clean and clearly marked to avoid contamination of materials.

- D. Sorting: The following sorting methods are acceptable:
1. Sorting recyclable materials at the Project site and transporting them to recycling markets directly from the Project site.
  2. Employing haulers who make use of a materials-recovery facility or a transfer station where recyclable materials are sorted from the waste and recycled before disposing of the remainder. If using a hauler or recycling facility to sort out recyclables, verify that the hauler sorts out all construction waste loads and is not limited to those that are not acceptable at the landfill. Also, verify that the hauler or recycling facility recycles at least three types of materials.
- E. Hazardous Waste: Hazardous Waste is a separate category and not part of the basis on which the recycling percentage is calculated.

END OF SECTION



SECTION 01 7600 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY

- A. Section includes administrative and procedural requirements for the following:
  - 1. Periodic construction photographs.

1.2 SUBMITTALS

- A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph. Indicate elevation or story of construction. Include the same label information as the corresponding set of photographs.
- B. Construction Photographs: Name each photographic view within 7 days of taking photographs.
  - 1. Format: Large format (1280x1024 pixels count / resolution).
  - 2. Organization: Organize photos in manner as necessary to provide easy identification of area of photograph and date.
  - 3. Electronic Data Transfer: Provide CD-ROM or DVD of each photograph in jpg or tiff format at completion of Project.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.1 PHOTOGRAPHS, GENERAL

- A. Date Stamp: Unless otherwise indicated, date and time stamp each photograph as it is being taken so stamp is integral to photograph.
- B. Field Office Prints: Retain progress photographs in the field office at project site, available at all times for reference. Identify photographs as indicated in paragraph 1.2.B above.

3.2 CONSTRUCTION PHOTOGRAPHS

- A. Preconstruction Photographs: Before starting construction, take photographs of project site and surrounding properties from different vantage points.
  - 1. Take 6 (min) photographs to show existing conditions adjacent to the site before starting the Work.
- B. Periodic Construction Photographs: Take photographs weekly. Select vantage points to best show status of construction and
- C. Progress since the last photographs were taken.

- D. Specific Photographs: Take photographs of items that shall be covered-up by subsequent work or trades. Select vantage points to best show work as completed with clearances and surrounding materials.

END OF SECTION

## SECTION 01 7700 - CLOSEOUT PROCEDURES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section describes procedures for project closeout as indicated in accordance with the provisions of the Contract Documents.

#### 1.3 SUBSTANTIAL COMPLETION AND FINAL INSPECTION

- A. When the Contractor is of the opinion that the Project is Substantially Complete, in accordance with the amendments to the General Conditions, he shall send to the Architect a written statement that the Work is complete and shall request a Substantial Completion inspection by the Architect. Such notice shall be given at least 7 days before the requested inspection date. If the Architect finds the Work not to be Substantially Complete, the Architect shall advise Contractor in writing as to the reasons for such determination. After satisfying the Architect on either the first or subsequent inspection(s) that Substantial Completion has been achieved, the Architect shall so notify the Owner and establish a date and time for a Substantial Completion inspection to be attended by the Contractor, the Architect, and the Owner.
- B. Once the Architect and Owner agree that Substantial Completion has been achieved, Architect shall prepare a Certificate of Substantial Completion, AIA Document G704, for the approval and acceptance of the Contractor and Owner, attaching thereto a "punch list" prepared by the Contractor and reviewed by the Architect of items to be completed and corrected. This list will be as complete as possible, based on the Contractors and Architect's observations, but shall not relieve or otherwise waive the Contractor's responsibility to complete or correct subsequently discovered items.
- C. Final Application for Payment will not be accepted and processed until the Owner is satisfied that the Work is satisfactorily completed, including "punch list" items; and that all manuals, documents, guarantees, as-built, and as-built drawings, as required by the Specifications, have been received and accepted by the Architect. Final Application for Payment shall be accompanied by the executed AIA Document G706 entitled "Contractor's Affidavit of Payment of Debts and Claims" and Document G707 entitled "Consent of Surety Company to Final Payment."

#### 1.4 FINAL ADJUSTMENT, TESTS AND DEMONSTRATIONS

- A. All tests shall be scheduled through the Architect and shall be witnessed by the Owner's representative for (but not necessarily limited to) the following tests:
  - 1. Sterilization of Potable Water Systems: Divisions 22 and 33.
  - 2. Waste Systems Hydrostatics Pressure: Division 22.

3. Water Systems Pressure Testing: Division 22.
  4. Testing, Adjusting, and Balancing: Division 23.
  5. Overload Protection Certification: Division 26.
  6. Ground Fault Equipment: Division 26.
  7. Fire Protection Systems: Division 21.
- B. Certificate of Occupancy: All required certificates of inspection, tests, or approvals shall be secured by the Contractor from the governing authority. Promptly deliver the Certificate of Occupancy to the Architect.
- C. Final Flush of HVAC System: After construction ends, prior to occupancy and with all interior finishes installed, perform a building flush-out by supplying a total volume of 14,000 cu. ft. of outdoor air per sq. ft. of floor area while maintaining an internal temperature of at least 60 deg F and a relative humidity no higher than 60 percent. Contractor shall provide all additional equipment necessary to maintain interior environment during building flush period.
1. Documentation: Provide signed statement describing the building air flush-out procedures including the dates when flush-out was begun and completed for each area and statement that filtration media was replaced after flush-out.

#### 1.5 WARRANTIES AND BONDS

- A. See Section 01 7836.

#### 1.6 RECORD DRAWINGS

- A. See Section 01 7839.

#### 1.7 PROJECT DIRECTORY

- A. Provide a typed list of all known major material/equipment suppliers and subcontractors, identified by name, address, telephone number, and contact person.

#### 1.8 PROJECT CLOSE-OUT SUBMITTALS

- A. At the time of Substantial Completion and prior to final payment, the Contractor shall deliver to the Owner via the Architect, the following items as described previously in this Section:
1. Project Directory.
  2. Record Drawings.
  3. Warranties and Bonds.
  4. Certificate of Occupancy.
  5. Test Certificates.
  6. Progress photograph disc(s).
  7. Other records or information as may be required in other Sections of the Contract Documents.

#### 1.9 POST-CONSTRUCTION INSPECTION

- A. Architect will make visual inspections of Project in company of Owner and Contractor to determine whether correction of Work is required in accordance with provisions of the General Conditions.

- B. The Architect will promptly notify Contractor of any observed deficiencies.

PART 2 - PRODUCTS - (Not Applicable)

PART 3 - EXECUTION - (Not Applicable)

END OF SECTION



SECTION 01 7701 - CLOSEOUT CHECK LIST

PART 1 - GENERAL

CONTRACTOR RETENTION RELEASE

PROJECT: \_\_\_\_\_ COUNTY No. \_\_\_\_\_  
FACILITY: \_\_\_\_\_ PROJECT. No. \_\_\_\_\_  
CONTRACTOR: \_\_\_\_\_

The general requirements for retention release on Pinal County projects are listed below.

Submit the items required for your contract and project specifications as well as special items called for in the specifications not covered by this list.

- A. General Requirements: (6 originals each)
  - 1. Certificate of Substantial Completion - AIA Form G704 \_\_\_\_\_
  - 2. Final Pay Request \_\_\_\_\_
  - 3. Affidavit of Payment of Debts & Claims - AIA Form G706 \_\_\_\_\_
  - 4. Affidavit of Release of Lien - AIA Form G706A \_\_\_\_\_
  - 5. Consent of Surety - AIA Form G707 \_\_\_\_\_
  - 6. Architects' Letter Certifying All Punch List Items  
Are Completed \_\_\_\_\_
  - 7. Contractor and Architect/Engineers' Asbestos Free Certification Letters \_\_\_\_\_
  
- B. Lien Waivers:
  - 1. All Subcontractors and Material Suppliers (see list submitted  
with bid and all approved substitutions) \_\_\_\_\_
  - 2. All Vendors with Preliminary Notices Filed \_\_\_\_\_
  
- C. Guarantees: (These are minimum warranty periods unless specifications state  
otherwise.)
  - 1. Total project guarantee, two year by Contractor \_\_\_\_\_
  
- D. "As-Built" Drawings: Complete set of Construction Documents, including CD ROM.
  - 1. 3 copies \_\_\_\_\_
  
- E. Record Specifications \_\_\_\_\_

F. Record Construction Documentation:

- |    |                                       |       |
|----|---------------------------------------|-------|
| 1. | Addenda                               | _____ |
| 2. | Architect's Supplemental Instructions | _____ |
| 3. | Engineer's Supplemental Instructions  | _____ |
| 4. | Change Orders                         | _____ |
| 5. | Construction Change Directives        | _____ |
| 6. | Authorized Use of Allowances          | _____ |
| 7. | Requests for Information              | _____ |

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION

SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

- A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under the Contract. Prepare operating and maintenance data as specified in this section and as referenced in other pertinent sections of specifications.
  - 1. Contractor may submit videotaped instruction for selected procedures in lieu of written/pictorial instruction specified herein. Consult with Architect to determine applicable procedure prior to beginning videotaping.
- B. Submit clear, clean and concise information as specified in this section and as referenced in other sections of specifications to the Architect for incorporation in an operating and maintenance manual.
- C. Related Work Specified Elsewhere:
  - 1. Shop Drawings, Product Data and Samples: Section 01 3323.
  - 2. Closeout Procedures: Section 01 7700.
  - 3. Project Record Documents: Section 01 7839.
  - 4. Demonstration and Training: Section 01 7900.
  - 5. Warranties: Section 01 7836.

1.3 QUALITY ASSURANCE

- A. Operation and maintenance manuals will be for training of and use by the Owner's personnel in the operation and maintenance of the systems and related equipment, if applicable, as specified below. The manuals shall consist of instructions on systems and equipment. A separate manual or chapter shall be prepared for each class of equipment or system listed:
  - 1. Miscellaneous building equipment and systems
  - 2. Sprinkler systems
  - 3. Plumbing systems
  - 4. Domestic hot water systems
  - 5. Wall hydrants
  - 6. Pumps
  - 7. HVAC systems.
  - 8. Exhaust systems
  - 9. Smoke control system.
  - 10. Temperature control systems
  - 11. Controls and sequence of operations
  - 12. Motor starters
  - 13. Variable frequency drives

14. Condensing units
15. Electrical systems
16. Self-contained emergency systems
17. Panel boards
18. Switchboards
19. Transformers
20. Lighting
21. Fire alarm system
22. Security CCTV system
23. Audio video systems
24. Voice data distribution system

- B. Verify with all technical specifications the requirements for systems/products for O&M manuals.

#### 1.4 INDEX

- A. Information shall be complete and specific to this Project application. All material must be neat and legible.
- B. Information shall be submitted on sheets measuring 8-1/2 inches by 11 inches except drawings which should not exceed 30 inches by 42 inches.
- C. Text information shall be manufacturers' printed data or neatly typewritten.
- D. Clearly label each submittal for each piece of equipment or product separately called for in the Specifications with the Section number of the Specifications and the applicable drawing sheet number.
- E. Each submittal shall include the following basic information for each piece of equipment, product or system:
  1. Introduction
  2. Table of Contents
  3. Description of system (including design intent and considerations)
  4. Operating sequence and procedures
  5. Maintenance instructions and requirements
  6. Diagrams
  7. Parts list
  8. Manufacturer
  9. Subcontractor or installer
  10. Maintenance contractor, if applicable
  11. Local source of supply for parts and replacement
- F. Product data to be provided by Contractor:
  1. Include only information that is applicable to the specific product.
  2. Annotate each sheet to:
    - a. Clearly identify the specific product or part installed.
    - b. Clearly identify the data applicable to the installation.
    - c. Delete references to inapplicable information.

- d. Provide parts breakdown.
  - e. Provide assembly drawings
- G. Provide a copy of each warranty, bond or service contract issued. Submit with the foregoing an information sheet for Owner's personnel which includes:
- 1. Effective dates or period
  - 2. Proper procedures in the event of failure
  - 3. Instances which might affect the validity of warranties, bonds or service contracts.

#### 1.5 PREPARATION

- A. The following subparagraphs are intended as a general guide in preparing the manuals. The manuals shall be prepared to provide for the optimum operation and maintenance of the various systems. The description of systems and general operation instructions for mechanical and electrical manuals shall cover in detail complicated, customized or unusual parts of these systems. Manufacturer's literature and data shall be that of the actual equipment installed under contract for the particular facility. Further guidance is available in the ASHRAE Handbook, 2011, HVAC Applications Chapter 39 Operations and Maintenance Management.
- B. Manuals shall be properly organized and professionally prepared. Literature, instructions, etc., shall all be typed. Drawings shall be professionally drafted. Manuals shall be completely customized to this specific project. Crossed out information and generic diagrams and information is not acceptable. Inapplicable data and reference to inapplicable data shall be deleted.

#### 1.6 MAINTENANCE AND OPERATION MANUALS

- A. Thirty days prior to scheduled date of Substantial Completion, provide 3 copies of maintenance and operation instructions in electronic pdf format bookmarked by system and specification number relating to all manufactured items of equipment and materials requiring maintenance (i.e., HVAC equipment, sprinkler controls, electrical devices, etc.).
- B. The manuals shall be contained in electronic and hard copies in hard back binders properly identified on front cover with project name, subcontractor, and general content. The material shall be suitably tab-indexed for ready reference, include a Table of Contents, and contain, as available from the Manufacturer/Supplier, the following information:
- 1. Name of equipment, item and function.
  - 2. Manufacturer name and address.
  - 3. Model No. and Serial No., with option equipment identification.
  - 4. Rating in KW, HP, BTU, GPM, etc.
  - 5. Description of feature in model provided.
  - 6. Drawings of part(s) or assembly (ies) - control diagrams, parts lists, etc.
  - 7. Connection diagrams, mounting details, installation information, etc.
  - 8. Operation and maintenance information for services by Owner.
  - 9. Name, address, and telephone number of local supplier or service department.

## 1.7 SUGGESTED OUTLINE FOR OPERATING AND MAINTENANCE MANUALS

- A. This is a suggested outline with general requirements of O&M manuals. The outline is presented to indicate the extent and items required in manuals for major facilities. The outline may be modified to suit specific installations; however, the intent of the manual must be fulfilled. It is not intended to duplicate manufacturer's data, but proper references should be made in the text of the O&M manual to indicate that information is applicable and where it is located.

## PART 2 - DESCRIPTION AND DESIGN INTENT

### 2.1 INTRODUCTION

- A. Scope. Brief description of project and purpose of manual. Provide a system description (written and diagrammatic). The following statements shall also be included; operation and maintenance of this equipment shall be performed in accordance with this manual and posted instructions, subject to compliance with applicable technical guides and standards issued by the Owner. It is recognized that minor changes in control points and settings will be required, based on actual operating experience, to correct varying conditions and improve operation. When such changes appear necessary, they shall be submitted to the Chief Operating Engineer for consideration. Upon approval of any changes, the applicable portions of all copies of the manual and proposed instructions shall be revised, reissued and any change in operating procedure brought to the attention of all operating personnel.
- B. "This manual is specifically developed to assist the Owner's personnel in charge at the facility to operate and maintain the building systems and equipment. Manufacturers' recommendations set forth for certain components MUST be followed during the complete warranty period for that equipment."
- C. Contents of Manual. This portion of the introduction shall contain an explanation that the manual is presented in a number of volumes which contain complete operating, maintenance and safety instructions for all equipment listed any other appropriate references as required to outline an explanation of the manuals and major categories of reference materials required with the manuals.

### 2.2 TABLE OF CONTENTS

- A. The Table of Contents shall list numbers and titles of chapters, selections and main paragraphs with their page numbers. Each volume in a set of manuals shall contain its own Table of Contents. Publications containing ten or more illustrations or tables as applicable. These lists shall show number, title and page number of each illustration and/or table. Following is a typical partial Table of Contents:

#### Mechanical Systems

1. Space conditioning
2. Heating
3. Air conditioning systems
4. Air distribution and ventilating
5. Temperature control

Plumbing Systems

1. Potable water
2. Domestic hot water
3. Roof and sanitary drains

Fire Protection System

1. Water supply and distribution
2. Fire department connections
3. Fire extinguishers
4. Exit signs
5. See "Electrical for Fire Alarms and Emergency Lighting Units"

Electrical Systems

1. Electrical power distribution
2. Lighting
3. Fire alarm
4. Security and access control
5. Audio visual
6. Voice data

2.3 PART II - OPERATING SEQUENCE AND PROCEDURES

- A. Contents: The operating volume(s) shall contain a chapter for each item included in Part I. Each chapter shall describe the procedures necessary for Owner's personnel to operate the system and equipment covered in that chapter.
- B. Operating Procedures: The operating procedures shall be divided into four subsections: start-up, operation, emergency operation, and shutdown.
- C. Start-up: Give complete instructions for energizing the equipment and making initial settings and adjustments whenever applicable. If equipment is fully automatic, a statement to that effect is all that is required. If a specific sequence of steps must be performed, give step-by-step instructions in the proper sequence. If timing (such as warm-up between power-on and adjustment) is important, clearly state the specific minimum time required at the proper point in the procedure. Refer to controls and indicators by panel; make reference consistent with the nomenclatures used in illustrations and tables of controls and indicators. If preliminary settings differ for different modes of operations, give procedures for each mode.
- D. Operation: Give detailed instruction in proper sequence for each mode of operation. Where, for a given action on the part of the operator, alternate equipment responses are possible, give the appropriate reaction to each.
- E. Emergency Operation: If some functions of the equipment can be operated while other functions are disabled, give instructions for operations under these conditions. Include here only those alternate methods of operation (from normal) which the operator can follow when there is a partial failure or malfunctioning of components, or other unusual condition.
- F. Shutdown Procedure: Include instructions for stopping and securing the equipment after operation. If a particular sequence is required, give step-by-step instructions in that order.

2.4 PART III - MAINTENANCE INSTRUCTIONS AND REQUIREMENTS

A. Contents. The maintenance volume(s) shall contain a chapter for each item included in Part I. Each chapter shall describe the procedures necessary for the Owner's personnel to perform the maintenance of the systems and equipment covered in that chapter. Emphasis should be made on the method of mechanical control of systems and equipment from a maintenance standpoint. Reference shall be made, as appropriate, to Drawings, schematics and sequences of operation included as part of the construction Contract Drawings and Specifications which show piping and equipment arrangements and items of control. Prints of these Drawings shall be reduced to 11 x 17 inches for insertion in the manuals. Drawings shall represent the "as-built" condition.

B. Maintenance Procedures: The maintenance procedures shall be divided into two categories: Preventative maintenance and corrective maintenance.

Preventative Maintenance

1. Provide a schedule for preventative maintenance. State preferably in tabular form the recommended frequency of performance for each preventative maintenance task (cleaning, inspection, and scheduled overhaul).
2. Provide instruction and schedules for all routine cleaning and inspection and lubrication as applicable. List recommended lubricants. Provide diagrams clearly showing location of lubrication points. Provide detailed blowups as necessary.
3. If periodic inspection of equipment is required for operation, cleaning or other reasons, indicate the items to be inspected and give the inspection criteria for, but not limited to, the following:
  - a. Motors.
  - b. Filters.
  - c. Water heaters.
  - d. Rooftop heat pumps.
  - e. Rooftop ERV units.
  - f. Smoke detectors, including in duct detectors.
  - g. Exhaust fans.
  - h. Smoke control system.
  - i. Plumbing fittings and specialties.
  - j. Plumbing fixtures.
  - k. Generator systems.
4. Provide instructions for minor repairs or adjustments required for preventative maintenance routines. Minor repair and adjustment shall be limited to repairs and adjustments which may be performed without special tools or test equipment and which require no special training or skills. Identify test points and give values for each.

Corrective Maintenance

1. Corrective maintenance instructions shall be predicated upon a logical effect-to-cause troubleshooting philosophy and a rapid replacement procedure to minimize equipment downtime. Instructions and data shall appear in the normal sequence of corrective maintenance, i.e., troubleshooting first, repair and replacement of parts, then the parts list.

2. Troubleshooting: This information shall describe the general procedure for locating malfunctions and shall give, in detail, any specific remedial procedures or techniques. The data shown are intended to isolate only the most common equipment deficiencies. Troubleshooting tables, charts or diagrams may be used to present specific procedures. A guide to this type shall be a three column chart. The columns shall be entitled: Malfunction; Probable Cause; and Recommended Action. The information shall be alphabetically arranged as to type of component, and each component shall, in turn, list deficiencies that may be expected. Each deficiency shall contain one or more problems with a recommended correction.
3. Repair and Replacement: Indicate repair and replacement procedures most likely to be required in the maintenance of the equipment. Information included here shall consist of, in step-by-step fashion the instructions for repair and replacement of defective items. Include all information required to accomplish the repair or replacement, including such information as torque values and identifying all tools, special equipment and materials which might be required. Identify uses for maintenance equipment. The paragraphs shall contain headings to identify the topics covered.
4. Safety Precautions: This subsection shall comprise a listing for safety precautions and instructions to be followed before, during and after making repairs, adjustments or routine maintenance.

## 2.5 PART IV - DIAGRAMS

- A. Providing wiring diagrams of equipment. Provide color coded wiring diagrams of installed systems showing all power, control and communication wiring as applicable. All diagrams shall be customized for this project.
- B. Provide piping and flow diagrams and risers for applicable systems. Provide color coded piping diagrams of all mechanical and plumbing piping. Diagrams shall show flow direction and pipe sizes and identify all valves. Valves shall be labeled and numbered corresponding to actual valve tag. Valve labels shall be cross-referenced in operation and maintenance portion of the manual.
- C. For electrical equipment, provide circuit directories or zoning of the systems as applicable.

## 2.6 PARTS LIST

- A. Provide original manufacturer's parts list, current prices, illustrations, assembly drawings and diagrams required for maintenance.
- B. Provide a schedule of predicted life of parts subject to wear.
- C. Provide a schedule of items and quantity recommended to be stocked as spare parts. List spare parts initially supplied by manufacturer or provided under this contract.
- D. List names, addresses, phone numbers and contact person for supplier, alternative parts suppliers and factory parts department.

- E. Include copies of each warranty, bond or service agreement. Include name, address, telephone number of responsible organization and contact individual. List proper procedures to follow in the event of failure. List what actions by the Owner might affect validity of warranties, bonds, or service agreements.

## 2.7 POSTED OPERATING INSTRUCTIONS

- A. General. Operating instructions and diagrams shall be prepared for posting near the equipment. Posted operating instructions shall be photographic or equal nonfading reproductions framed under glass or encased in nondiscoloring plastic and shall be mounted in locations near the appropriate piece of equipment. Instructions and diagrams shall also be used with the operating and maintenance manuals as a basis in training Owners personnel in the operation and maintenance of systems and related equipment installed under Contract at the facility.
- B. Contents. Posted operating instructions shall consist of simplified, consolidated equipment, control and power diagrams graphically representing the entire system and actual equipment installed, including concise written instructions on how to start and stop systems, what settings and conditions are to be observed and what control adjustments are to be made or maintained by the operator.

## 2.8 SUBMITTALS

- A. Preliminary submittal. Four draft copies of the complete manuscript for items as outlined herein and training programs in outline form shall be submitted to the Architect for Architect review 60 calendar days after approval of equipment. One copy will be returned to the Contractor within 30 days after submittal, and, if required, will be revised and resubmitted within 30 calendar days.
- B. Second submittal. Submit four draft copies of the final draft manual with all revision incorporated along with an agenda of the training programs to the Architect for Architect review at least 30 days prior to the Contractor reaching Substantial Completion. Final review comments will be returned within 8 calendar days following final inspection or acceptance.
- C. Final submittal. Submit 4 complete sets of manuals to the Architect within 6 calendar days of receipt of the final comments.
- D. Make necessary corrections and/or additions to the manuals after conducting training for the Owner's personal and throughout the warranty period should conditions so warrant.
- E. All submittals shall be bound in 3-ring notebooks, with adequate room for material and adequately labeled.
  - 1. Binders shall be D-ring type, same size and color for entire set.
  - 2. Each binder shall have an index for the entire set.
  - 3. Each binder shall contain the following information on binder cover and spine:
    - a. Owner name,
    - b. Facility project name,
    - c. Facility project address and cross streets.

PINAL COUNTY  
PINAL COUNTY SUPERIOR COURTS EXPANSION  
FLORENCE, ARIZONA

30-15122-00

100% CONSTRUCTION DOCUMENTS

PART 3 - EXECUTION - (Not Applicable)

END OF SECTION



SECTION 01 7836 - WARRANTIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

- A. Provide written warranties, guarantees, bonds or service contracts for all products and installations.
- B. Provide warranties, guarantees, bonds or service contracts for period(s) indicated.
- C. Provide manufacturer's warranties or guarantees for products.
  - 1. Where manufacturer's standard warranties or guarantees expire before expiration date required by Contract Documents, obtain and pay for warranty or guarantee extensions, at no additional cost to Owner.
- D. Provide all warranties, guarantees, bonds or service contracts prior to final acceptance.
- E. Provide Architect a copy of each warranty, guarantee, and bond or service contract issued. Submit with each of the foregoing an information sheet for Owner's personnel which includes:
  - 1. Effective dates or period.
  - 2. Proper procedures in the event of failure.
  - 3. Instances which might affect the validity of warranties, bonds or service contracts.
- F. Submit all warranties, guarantees, bonds or service contracts identified by Specification Section and equipment identification used in operating and maintenance data.
- G. Submit a schedule of all warranties, guarantees, bonds, or service contracts at least 60 calendar days prior to Substantial Completion.
- H. Related Work Specified Elsewhere:
  - 1. Technical Specifications: Divisions 02 through 33
  - 2. Closeout Procedures: Section 01 7700
  - 3. Project Record Documents: Section 01 7839

1.3 WARRANTIES AND BONDS

- A. Contractor shall provide written warranties and bonds in favor of the Owner, as required by respective Sections of these Specifications, and arrange to commence at the date of Substantial Completion of the Project or date of installation of warranted item(s), whichever is later.

- B. Provisions of contract concerning Work provided or corrected after date of completion under provisions of the Contract (or any other provisions of the Contract except maintenance requirements) and all affected work are extended for period equal to original period of corrective or otherwise provided Work. Time coverage extension provisions of the Paragraph are not applicable to items of Work or equipment when so stipulated in the particular Specification Section for that time.
- C. During the period of any guarantee, the Contractor shall provide services within a reasonable time following a request by the Owner to do so. When the complete breakdown of a piece of equipment occurs, the service shall be performed within a reasonable amount of time. The service shall be provided during normal working hours, unless otherwise specified herein. Should the listed service agency fail to perform the service in a reasonable amount of time, the Contractor shall provide the service through any other agency that will comply.

#### 1.4 CORRECTION PERIOD

- A. Remedy any defects due to faulty materials or workmanship and pay for any damage to other work resulting therefrom, which shall appear in work within period of one year from date of Substantial Completion and in accordance with terms of any special warranties provided or required by Contract Documents. Owner shall give notice of observed defects with reasonable promptness.
- B. On a monthly basis during correction period, provide Owner and Architect with warranty work report indicating the following as a minimum:
  - 1. Date of service call.
  - 2. Service call description.
  - 3. Action taken.
  - 4. Date of completion of warranty work.
  - 5. Name of contractor and individuals performing work.
- C. Contractor/Owner/User/Architect will be present at an 11-month walk through to establish all warranty and warranty related items are complete. Any outstanding items will be included in a deficiencies list and tracked through completion to the satisfaction of the Architect.

PART 2 - PRODUCTS - (Not Applicable)

PART 3 - EXECUTION - (Not Applicable)

END OF SECTION

SECTION 01 7839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

- A. Work Included:
  - 1. Throughout progress of the Work of this Contract, the Contractor shall maintain an accurate record of all changes in the Contract Documents, as described in Paragraph 3.1 below.
  - 2. Upon completion of the Work of this Contract, the Contractor shall transfer the recorded changes to electronic format (BIM, lod 300) and provide electronic file documents to Architect and Owner on two external hard drives. In addition provide two ½ size hard copies of all drawings.
- B. Related Work Described Elsewhere:
  - 1. Shop Drawings, Product Data, and Samples: Section 01 3323.
  - 2. Project Closeout: Section 01 7700.

1.3 QUALITY ASSURANCE

- A. General: Maintenance of Record Documents shall be the responsibility of one person on the Contractors staff as approved in advance by the Architect.
- B. Accuracy of Records: Thoroughly coordinate all changes within the Record Documents, making adequate and proper entries on each page of Specifications and each sheet of Drawings and other Documents where such entry is required to properly show the change. Accuracy of records shall be such that future searcher for items shown in the Contract Documents may reasonably rely on information obtained from the approved Record Documents.
- C. Timing of Entries: Make all entries weekly after receipt of information.
- D. The Architect and the Owner shall examine the Contract Documents at selected intervals to assure the Contractors compliance for updating entries. Should the Contractor fail to satisfy the requirements of this section the Owner shall withhold the Contractors monthly payment request until said requirements are satisfied?

1.4 SUBMITTALS

- A. General: The Architect's approval of the current status of Record Documents will be a prerequisite to the Architect's approval of requests for progress payment and request for final payment under the Contract.

- B. Final Submittal: Prior to submitting final Application for Payment, submit the final Record Documents required by Contract to the Architect and secure his approval.

#### 1.5 CONSTRUCTION RECORD PHOTOGRAPHS

- A. General: The Contractor shall be required to provide construction photographs as specified in Section 01 7600 "Photographic Documentation."

#### 1.6 PRODUCT HANDLING

- A. Use all means necessary to maintain the job set of Record Documents completely protected from deterioration and from loss and damage until completion of the Work and transfer of the recorded data to the final Record Documents. In the event of loss of recorded data, use all means necessary to secure the data to the Architect's approval; such means shall include, if necessary in the opinion of the Architect, removal and replacement of concealing materials and, in such case, all replacements shall be to the standards originally specified in the Contract Documents.

### PART 2 - PRODUCTS

#### 2.1 RECORD DOCUMENTS

- A. Job Set: Promptly following award of Contract, secure from the Architect, at no charge to the Contractor, one electronic BIM file of building documents, as well as Auto Cad files for Civil and Security/AV.
- B. The Contractor shall provide a complete set of Contract drawings in electronic format, clearly delineating all changes in the Work and dimensioned final locations of all schematically shown underground utility lines. These Record Drawings shall also reflect all changes due to Addenda issued at bidding time and change order items during construction, whether added or deleted. The change order and Addendum items shall be properly referenced by number.
- C. The set of record documents shall be maintained at the job site and be readily available for inspection by the Architect. All changes shall be legibly marked and kept current.
- D. In showing changes in the Work, or added work, use the same legends as were used on the Contract Drawings. Indicate exact locations by dimensions, and exact elevations, given by job datum. Given dimensions from a permanent point of reference. Given elevations to sewer and drainage lines to the invert elevation.
- E. Mechanical and electrical Record Drawings shall indicate exact routing of electrical feeders, main piping and ductwork and all concealed piping and conduit systems not easily located through the accesses provided.

PART 3 - EXECUTION

3.1 MAINTENANCE OF JOB SET

- A. Identification: Immediately upon receipt of the job set described in Subparagraph 2.1.A above, identify electronic file with the title "RECORD DOCUMENTS - JOB SET."
- B. Preservation:
  - 1. Do not use the job set for any purpose except entry of new data and review by the Owner and/or Architect, until start of transfer of data to final Record Documents.
- C. Making Entries on Drawings: Make entries on Drawings in color easily identifiable. Date all entries with date modification was performed.
- D. Accuracy of Entries: Use all means necessary, including the proper tools and necessary labor for measurement, to determine actual locations of the installed items.

END OF SECTION



SECTION 01 7900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

- A. Provide demonstrations and instructions for all equipment and systems for which operating and maintenance data is required. See individual sections.
- B. Provide demonstration and training videos as specified.

1.3 QUALITY ASSURANCE

- A. Instructors: Member(s) of installers' staff and authorized representative(s) of component, assembly, or system manufacturer(s). See individual sections for additional requirements.

1.4 SUBMITTALS

- A. Schedule of Demonstrations: Submit for approval at least 2 weeks prior to first demonstration.
- B. List of instructors and schedule of instruction. Submit for approval at least 2 weeks prior to first instruction period.

1.5 JOB CONDITIONS

- A. Complete demonstrations prior to Substantial Completion. Coordinate with procedures for Substantial Completion to provide separate demonstrations.
- B. Complete all instruction prior to Final Completion.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA

- A. Video Format: Provide high-quality DVD.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Do not begin demonstrations until the component, assembly or system being demonstrated has been tested as specified and is in satisfactory operating condition.

- B. Do not begin instruction until demonstration is complete.
- C. Assemble instructional aids.
  - 1. Have operating and maintenance data available for use during instruction (see Section 01 7823).

### 3.2 DEMONSTRATION

- A. Inspect and operate satisfactorily, in presence of Architect and Owner, each system and item of equipment, including accessories.
- B. Replace defective work or material.
- C. Repeat inspection and demonstration until defects are eliminated.

### 3.3 INSTRUCTION

- A. Instruct Owner's personnel in operation and maintenance of equipment and systems.
  - 1. Provide all necessary instruction to satisfaction of Owner.
- B. Explain use of operating and maintenance manuals.
- C. Tour building areas involved and identify:
  - 1. Maintenance points and access.
  - 2. Control locations and equipment.
- D. Explain operating sequences.
  - 1. Identify location and show operation of switches, valves, etc., used to start, stop and adjust systems.
  - 2. Explain use of flow diagrams, operating sequence diagrams.
  - 3. Demonstrate operation through complete control cycle and full range of operation in all modes, including testing and adjusting relevant to operation.
- E. Explain use of control equipment, including temperature settings, switch modes, available adjustments, ring of gages and functions that must be serviced only by authorized factory representatives.
- F. Explain troubleshooting procedures.
  - 1. Demonstrate commonly occurring problems.
  - 2. Note procedures which must be performed by factory personnel.
- G. Explain maintenance procedures and requirements.
  - 1. Point out items requiring periodic maintenance.
  - 2. Demonstrate typical preventive maintenance procedures and recommended typical maintenance intervals.
  - 3. Demonstrate other commonly occurring maintenance procedures not part of preventive maintenance program.
  - 4. Identify maintenance materials to be used.
- H. Furnish all tools required.

### 3.4 DEMONSTRATION AND TRAINING VIDEOS

- A. 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.
  - 2. Training modules shall correspond with list of items (HVAC, Electrical System, Piping and Plumbing, Miscellaneous) at end of this Section 01 7900.
- B. Record instruction of Owner's personnel in the operation and maintenance of equipment and systems. Edit video to remove no instructional conversation. Photographer shall select vantage points to best show equipment, systems, and procedures demonstrated. Minimum recording time for each of the 5 training modules shall be eight hours.

### 3.5 TRAINING

- A. The Contractor shall train Owner's designated representatives in the operation and maintenance of architectural, mechanical and electrical equipment. Coordination shall be maintained with systems designers for development of hours of instruction and scope of material to be covered. Training of Owner's designated representatives shall not commence until the Owner has received from the Contractor the final submittal copy of the operation and maintenance manual.
  - 1. Instruct Owner's personnel in operation and maintenance of all products, equipment and systems. Explain use of operating and maintenance manuals.
  - 2. Tour building areas involved and identify maintenance points and access and control locations and equipment.
  - 3. Explain operating sequences. Identify location and show operation of switches, valves, etc., used to start stop and adjust systems. Explain use of flow diagrams, operating sequence diagrams, etc. Demonstrate cooperation through complete control cycle and full range of operation in all modes, including testing, calibration and adjustment relevant to operation.
  - 4. Explain use of control equipment, including temperature setting; switch modes, available adjustments, reading gauges, and functions that must be serviced only by authorized factory representative.
  - 5. Explain troubleshooting procedures. Demonstrate commonly occurring problems. Note procedures which must be performed by factory personnel.
  - 6. Explain maintenance procedures and requirements. Point out items requiring periodic maintenance. Demonstrate typical preventive maintenance procedures and recommend typical maintenance intervals. Demonstrate other commonly occurring maintenance procedures not part of preventive maintenance program. Identify maintenance materials to be used.
  - 7. Emphasize safety procedures to be observed in operating and maintaining products, equipment and systems.
  - 8. Furnish all tools and equipment required.
- B. Schedule Submittal: The proposed scope of training and materials and instruction schedule shall be submitted for review and approval approximately 30 calendar days before the scheduled completion of the building. Mutually agreeable dates for training shall be arranged with the Owner, but the training must be completed prior to final acceptance of the facility.

- C. **Scope of Training:** Training shall include classroom and on-the-job instructions by qualified installation and maintenance personnel, having the necessary knowledge, experience and teaching skills. The use of factory personnel for training on major equipment items will be required. The qualifications of the training personnel shall be reviewed by the Architect prior to the training session. Any training session which is not acceptable to the Architect and the Owner shall be redone at the Contractor's expense. The General Contractor shall professionally record with video/audio complete instruction period as required. DVDs labeled and indexed shall be turned over to Owner after training has been completed. Contractor shall video with audio all of the training programs and shall deliver completed videos to the Owner.
- D. **Time Period of Training:** The minimum specific hours of training time required for each category of major equipment and systems shall be as stated below. Where additional time is required to completely cover material, provide at no additional cost. Past experience indicates a workable ratio in the vicinity of approximately 25 percent classroom and 75 percent application, except that the ratio may be reversed for control systems. The Owner shall have the option of reversed for control systems. The Owner shall have the total time specified. Training will be presented on an 8-hour per day, 5-day per week schedule, with all reading assignments and review to be within this period.

ITEM		TIME (HRS)
1.	HVAC: Heating, ventilating and air conditioning (HVAC) equipment together with their respective operation and safety controls.	60
2.	Electrical System: Covers all building services, lighting and intercommunications.	16
3.	Piping and Plumbing: Includes, but not limited to, domestic water supply, storm and sanitary drainage systems, cold water supply system, water heating system, irrigation, etc.	10
4.	Smoke Control System: Includes, but is not limited to, pressurization and exhausting equipment together with their respective operational, safety and over-ride controls.	30
5.	Miscellaneous: Includes, but not limited to, A/V equipment, safety & security equipment, fire protection and alarm equipment, door operators, and all other equipment not specifically covered above.	30

END OF SECTION

## SECTION 01 9113 - 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. Section Includes:

1. General requirements for coordinating and scheduling commissioning activities.
2. Commissioning meetings.
3. Commissioning reports.
4. Use of commissioning process test equipment, instrumentation, and tools.
5. Construction checklists, including, but not limited to, installation checks, startup, performance tests, and performance test demonstration.
6. Commissioning tests and commissioning test demonstration.
7. Adjusting, verifying, and documenting identified systems and assemblies.

B. Related Requirements:

1. Section 01 3323 "Shop Drawings, Product Data, and Samples" for submittal procedure requirements for commissioning process.
2. Section 01 7700 "Closeout Procedures" for Certificate of Construction-Phase Commissioning Process Completion submittal requirements.
3. Section 01 7823 "Operation and Maintenance Data" for preliminary operation and maintenance data submittal requirements.
4. Section 23 0800 "Commissioning of HVAC" for technical commissioning requirements for HVAC.

#### 1.3 DEFINITIONS

- A. Acceptance Criteria: Threshold of acceptable work quality or performance specified for a commissioning activity, including, but not limited to, construction checklists, performance tests, performance test demonstrations, commissioning tests, and commissioning test demonstrations.
- B. Basis-of-Design Intent: Refer to mechanical Drawings and Specifications that reflect concepts, calculations, decisions, and product selections used to comply with project requirements and to suit applicable regulatory requirements, standards, and guidelines.
- C. Commissioning Authority (CxA): An entity engaged by Contractor, and certified within the State project occurs to evaluate Commissioning-Process Work.

- D. Commissioning Plan: A document, prepared by Commissioning Authority, that outlines the organization, schedule, allocation of resources, and documentation of commissioning requirements.
- E. Commissioning: A quality-focused process for verifying and documenting that the facility and systems and assemblies indicated for commissioning are planned, designed, installed, and tested to comply with design intent. The requirements specified here are limited to the construction phase commissioning activities.
- F. Construction-Phase Commissioning-Process Completion: The stage of completion and acceptance of commissioning process when resolution of deficient conditions and issues discovered during commissioning process and retesting until acceptable results are obtained has been accomplished. Owner will establish in writing the date construction-phase commissioning-process completion is achieved.
  - 1. Commissioning process is complete when the Work specified of this Section and related Sections has been completed and accepted, including, but not limited to, the following:
    - a. Completion of tests and acceptance of test results.
    - b. Resolution of issues, as verified by retests performed and documented with acceptance of retest results.
    - c. Comply with requirements in Section 01 7900 "Demonstration and Training."
    - d. Completion and acceptance of submittals and reports.
- G. Owner's Witness: Owner's Project Manager, or Architect-designated witness authorized to authenticate test demonstration data and to sign completed test data forms.
- H. "Systems," "Assemblies," "Subsystems," "Equipment," and "Components": Where these terms are used together or separately, they shall mean "as-built" systems, assemblies, subsystems, equipment, and components.
- I. Test: Performance tests, performance test demonstrations, commissioning tests, and commissioning test demonstrations.
- J. Sampling Procedures and Tables for Inspection by Attributes: As defined in ASQ Z1.4.

#### 1.4 COMPENSATION

- A. If Architect, other Owner's witness, or Owner's staff perform additional services or incur additional expenses due to actions of Contractor listed below, compensate Owner for such additional services and expenses.
  - 1. Failure to provide timely notice of commissioning activities schedule changes.
  - 2. Failure to meet acceptance criteria for test demonstrations.
- B. Contractor shall compensate Owner for such additional services and expenses at rate agreed upon at time of signing Contract.

#### 1.5 COMMISSIONING TEAM

- A. Members Appointed by Contractor(s):

1. Commissioning Authority, plus consultants that Commissioning Authority may deem appropriate for a particular portion of the commissioning process.
2. Project superintendent and other employees that Contractor may deem appropriate for a particular portion of the commissioning process.
3. Subcontractors, installers, suppliers, and specialists that Contractor may deem appropriate for a particular portion of the commissioning process.
4. Appointed team members shall have the authority to act on behalf of the entity they represent.

B. Members Appointed by Owner:

1. Owner representative(s), facility operations and maintenance personnel, plus other employees, separate contractors, and consultants that Owner may deem appropriate for a particular portion of the commissioning process.
2. Architect, plus employees and consultants that Architect may deem appropriate for a particular portion of the commissioning process.

1.6 INFORMATIONAL SUBMITTALS

A. Comply with requirements in Section 013300 "Submittal Procedures" for submittal procedure general requirements for commissioning process.

B. Commissioning Plan Information:

1. List of Contractor-appointed commissioning team members to include specific personnel and subcontractors performing the various commissioning requirements.
2. Schedule of commissioning activities, integrated with the Construction Schedule. Comply with requirements in Section 01 3216 "Construction Progress Schedules" for the Construction Schedule general requirements for commissioning process.
3. Contractor personnel and subcontractors participating in each test.
4. List of instrumentation required for each test to include identification of parties that will provide instrumentation for each test.

C. Commissioning schedule.

D. Two-week look-ahead schedules.

E. Commissioning Agent (CxA) Qualification Data: For entity performing systems commissioning activities to demonstrate their capabilities and experience.

1. Expertise: Commissioning Agent shall be certified as Certified Commissioning Professional for systems indicated to have commissioning work performed.
2. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of etn previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

F. List test instrumentation, equipment, and monitoring devices. Include the following information:

1. Make, model, serial number, and application for each instrument, equipment, and monitoring device.
2. Brief description of intended use.

3. Calibration record showing the following:
  - a. Calibration agency, including name and contact information.
  - b. Last date of calibration.
  - c. Range of values for which calibration is valid.
  - d. Certification of accuracy.
  - e. Certification for calibration equipment traceable to NIST.
  - f. Due date of the next calibration.

G. Test Reports:

1. Pre-Startup Report: Prior to startup of equipment or a system, submit signed, completed construction checklists.
2. Test Data Reports: At the end of each day in which tests are conducted, submit test data for tests performed.
3. Commissioning Issue Reports: Daily, at the end of each day in which tests are conducted, submit commissioning issue reports for tests for which acceptable results were not achieved.
4. Weekly Progress Report: Weekly, at the end of each week in which tests are conducted, submit a progress report.
5. Data Trend Logs: Submit data trend logs at the end of the trend log period.
6. System Alarm Logs: Daily, at the start of days following a day in which tests were performed, submit printout of log of alarms that occurred since the last log was printed.

H. Construction Checklists:

1. Material checks.
2. Installation checks.
3. Startup procedures, where required.

## 1.7 CLOSEOUT SUBMITTALS

A. Commissioning Report:

1. At Construction-Phase Commissioning Completion, include the following:
  - a. Pre-startup reports.
  - b. Approved test procedures
  - c. Test data forms, completed and signed.
  - d. Progress reports.
  - e. Commissioning issue report log.
  - f. Commissioning issue reports showing resolution of issues.
  - g. Correspondence or other documents related to resolution of issues.
  - h. Other reports required by commissioning process.
  - i. List unresolved issues and reasons they remain unresolved and should be exempted from the requirements for Construction-Phase Commissioning Completion.
  - j. Report shall include commissioning work of Contractor.

B. Request for Certificate of Construction-Phase Commissioning Process Completion.

C. Operation and Maintenance Data: For proprietary test equipment, instrumentation, and tools to include in operation and maintenance manuals.

## 1.8 QUALITY ASSURANCE

- A. Commissioning Agent Qualifications:
1. Documented experience commissioning systems of similar complexity to those contained in these documents on at least five projects of similar scope and complexity.
  2. Certification of commissioning-process expertise. The following certifications are acceptable. Owner reserves the right to accept or reject certifications as evidence of qualification.
    - a. Certified Commissioning Professional, by Building Commissioning Association.
    - b. Commissioning-Process Management Professional, by American Society of Heating, Refrigerating and Air-Conditioning Engineers.
    - c. Accredited Commissioning-Process Authority Professional, by University of Wisconsin.
    - d. Accredited Commissioning-Process Manager, by University of Wisconsin.
    - e. Accredited Green Commissioning-Process Provider, by University of Wisconsin.
- B. Calibration Agency Qualifications: Certified by The American Association for Laboratory Accreditation that the calibration agency complies with minimum requirements of ISO/IEC 17025.

## PART 2 - PRODUCTS

### 2.1 TEST EQUIPMENT, INSTRUMENTATION, AND TOOLS

- A. Test equipment and instrumentation required to perform the commissioning process shall remain the property of Contractor unless otherwise indicated.
- B. Test equipment and instrumentation required to perform commissioning process shall comply with the following criteria:
1. Be manufactured for the purpose of testing and measuring tests for which they are being used and have an accuracy to test and measure system performance within the tolerances required to determine acceptable performance.
  2. Calibrated and certified.
    - a. Calibration performed and documented by a qualified calibration agency according to national standards applicable to the tools and instrumentation being calibrated. Calibration shall be current according to national standards or within test equipment and instrumentation manufacturer's recommended intervals, whichever is more frequent, but not less than within six months of initial use on Project. Calibration tags shall be permanently affixed.
    - b. Repair and recalibrate test equipment and instrumentation if dismantled, dropped, or damaged since last calibrated.
  3. Maintain test equipment and instrumentation.
  4. Use test equipment and instrumentation only for testing or monitoring Work for which they are designed.

## 2.2 PROPRIETARY TEST EQUIPMENT, INSTRUMENTATION, AND TOOLS

- A. Proprietary test equipment, instrumentation, and tools are those manufactured or prescribed by tested equipment manufacturer and required for work on its equipment as a condition of equipment warranty, or as otherwise required to service, repair, adjust, calibrate, or perform work on its equipment.
  - 1. Identify proprietary test equipment, instrumentation, and tools required in the test equipment identification list submittal.
  - 2. Proprietary test equipment, instrumentation, and tools shall become the property of Owner at Substantial Completion.

## 2.3 REPORT FORMAT AND ORGANIZATION

- A. General Format and Organization:
  - 1. Record report on compact disk.
  - 2. Electronic Data: Portable document format (PDF); a single file with outline-organized bookmarks for major and minor tabs and tab contents itemized for specific reports.
- B. Commissioning Report:
  - 1. Include a table of contents and bookmarked index to each test.
  - 2. Bookmark each Specification Section.
  - 3. Bookmark each test performed for each Specification Section.
  - 4. Within each testing bookmark, include the following:
    - a. Test specification.
    - b. Pre-startup reports.
    - c. Approved test procedures.
    - d. Test data forms, completed and signed.
    - e. Commissioning issue reports, showing resolution of issues, and documentation related to resolution of issues pertaining to a single test. Group data forms, commissioning issue reports showing resolution of issues, and documentation related to resolution of issues for each test repetition together within the minor tab, in reverse chronological order (most recent on top).

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Review preliminary construction checklists and preliminary test procedures and data forms.

### 3.2 CONSTRUCTION CHECKLISTS

- A. Construction checklists cannot modify or conflict with the Contract Documents.
- B. Create construction checklists based on actual systems and equipment to be included in Project.

- C. **Material Checks:** Compare specified characteristics and approved submittals with materials as received. Include factory tests and other evaluations, adjustments, and tests performed prior to shipment if applicable.
1. Service connection requirements, including configuration, size, location, and other pertinent characteristics.
  2. Included optional features.
  3. **Delivery Receipt Check:** Inspect and record physical condition of materials and equipment on delivery to Project site, including agreement with approved submittals, cleanliness, and lack of damage.
  4. **Installation Checks:**
    - a. Location according to Drawings and approved Shop Drawings.
    - b. Configuration.
    - c. Compliance with manufacturers' written installation instructions.
    - d. Attachment to structure.
    - e. Access clearance to allow for maintenance, service, repair, removal, and replacement without the need to disassemble or remove other equipment or building elements. Access coordinated with other building elements and equipment, including, but not limited to, ceiling and wall access panels, in a manner consistent with OSHA fall-protection regulations and safe work practices.
    - f. Utility connections are of the correct characteristics, as applicable.
    - g. Correct labeling and identification.
    - h. **Startup Checks:** Verify readiness of equipment to be energized. Include manufacturer's standard startup procedures and forms.
- D. **Startup:** Perform and document initial operation of equipment to prove that it is installed properly and operates as intended according to manufacturer's standard startup procedures, at minimum.
- E. **Performance Tests:**
1. **Static Tests:** As specified elsewhere, including, but not limited to, duct and pipe leakage tests, insulation-resistance tests, and water-penetration tests.
  2. **Component Performance Tests:** Tests evaluate the performance of an input or output of components under a full range of operating conditions.
  3. **Equipment and Assembly Performance Tests:** Test and evaluate performance of equipment and assemblies under a full range of operating conditions and loads.
  4. **System Performance Tests:** Test and evaluate performance of systems under a full range of operating conditions and loads.
  5. **Intersystem Performance Tests:** Test and evaluate the interface of different systems under a full range of operating conditions and loads.
- F. **Deferred Construction Checklists:** Obtain Owner approval of proposed deferral of construction checklists, including proposed schedule of completion of each deferred construction checklist, before submitting request for Certificate of Construction-Phase Commissioning Process Completion. When approved, deferred construction checklists may be completed after date of Construction-Phase Commissioning Completion. Include the following in a request for Certificate of Construction-Phase Commissioning Process Completion:
1. Identify deferred construction checklists by number and title.
  2. Provide a target schedule for completion of deferred construction checklists.
  3. Written approval of proposed deferred construction checklists, including approved schedule of completion of each deferred construction checklist.

- G. Delayed Construction Checklists: Obtain Owner approval of proposed delayed construction checklists, including proposed schedule of completion of each delayed construction checklist, before submitting request for Certificate of Construction-Phase Commissioning Process Completion. When approved, delayed construction checklists may be completed after date of Construction-Phase Commissioning Completion. Include the following in a request for Certificate of Construction-Phase Commissioning Process Completion:
1. Identify delayed construction checklist by construction checklist number and title.
  2. Provide a target schedule for completion of delayed construction checklists.
  3. Written approval of proposed delayed construction checklists, including approved schedule of completion of each delayed construction checklist.

### 3.3 GENERAL EXECUTION REQUIREMENTS

- A. Schedule and coordinate commissioning process with the Construction Schedule.
- B. Perform activities identified in construction checklists, including tests, and document results of actions as construction proceeds.
- C. Perform test demonstrations for Owner's witness. Unless otherwise indicated, demonstrate tests for 100 percent of work to which the test applies. In some instances, demonstration of a random sample of other than 100 percent of the results of a test is specified.
1. Where sampling is specified, the sampling plan and procedure for the test demonstration shall be determined using ANSI/ASHRAE/ACCA 183.
    - a. General and Special Inspection: As required per 2012 IECC for systems indicated.
    - b. Acceptance Quality Limit (AQL) of 1.5.
  2. On determination of the sample size, the samples shall be selected randomly by Owner's witness at the time of the test demonstration.
  3. Include in the Commissioning Plan a detailed list of the test demonstrations with lot and sample quantities for each test.
- D. Report test data and commissioning issue resolutions.
- E. Schedule personnel to participate in and perform Commissioning-Process Work.
- F. Installing contractors' commissioning responsibilities include, but are not limited to, the following:
1. Operating the equipment and systems they install during tests.
  2. In addition, installing contractors may be required to assist in tests of equipment and systems with which their work interfaces.

### 3.4 COMMISSIONING AGENT RESPONSIBILITIES

- A. Management and Coordination: Manage, schedule, and coordinate commissioning process, including, but not limited to, the following:
1. Coordinate with subcontractors on their commissioning responsibilities and activities.
  2. Obtain, assemble, and submit commissioning documentation.
  3. Attend periodic on-site commissioning meetings. Comply with requirements in Section 01 3119 "Project Meetings."

4. Develop and maintain the commissioning schedule. Integrate commissioning schedule into the Construction Schedule. Update Construction Schedule at specified intervals.
5. Review and comment on preliminary test procedures and data forms.
6. Report inconsistencies and issues in system operations.
7. Verify that tests have been completed and results comply with acceptance criteria, and that equipment and systems are ready before scheduling test demonstrations.
8. Direct and coordinate test demonstrations.
9. Coordinate witnessing of test demonstrations by Owner's witness.
10. Coordinate and manage training. Be present during training sessions to direct video recording, present training, and direct the training presentations of others. Comply with requirements in Section 017900 "Demonstration and Training."
11. Prepare and submit specified commissioning reports.
12. Track commissioning issues until resolution and retesting is successfully completed.
13. Retain original records of Commissioning-Process Work, organized as required for the commissioning report. Provide Owner's representative access to these records on request.
14. Assemble and submit commissioning report.

### 3.5 COMMISSIONING TESTING

- A. Quality Control: Construction checklists, including tests, are quality-control tools designed to improve the functional quality of Project. Test demonstrations evaluate the effectiveness of Contractor's quality-control process.
- B. Owner's witness will be present to witness commissioning work requiring the signature of an owner's witness, including, but not limited to, test demonstrations. Owner's project manager will coordinate attendance by Owner's witness with Contractor's published Commissioning Schedule. Owner's witness will provide no labor or materials in the commissioning work. The only function of Owner's witness will be to observe and comment on the progress and results of commissioning process.
- C. Construction Checklists:
  1. Complete construction checklists as Work is completed.
  2. Distribute construction checklists to installing contractors before they start work.
  3. Installers:
    - a. Verify installation using approved construction checklists as Work proceeds.
    - b. Complete and sign construction checklists as required for discussion at project meetings.
    - c. Items not conforming to indicated design intent shall be brought to the attention of the General
  4. Provide construction checklists.
- D. Installation Compliance Issues: Record as an installation compliance issue Work found to be incomplete, inaccessible, at variance with the Contract Documents, nonfunctional, or that does not comply with construction checklists. Record installation compliance issues on the construction checklist at the time they are identified. Record corrective action and how future Work should be modified before signing off the construction checklist.

- E. Pre-Startup Audit: Prior to executing startup procedures, review completed installation checks to determine readiness for startup and operation. Report conditions, which, if left uncorrected, adversely impact the ability of systems or equipment to operate satisfactorily or to comply with acceptance criteria. Prepare pre-startup report for each system.
- F. Test Procedures and Test Data Forms:
1. Test procedures shall define the step-by-step procedures to be used to execute tests and test demonstrations.
  2. Test procedures shall be specific to the make, model, and application of the equipment and systems being tested.
  3. Completed test data forms are the official records of the test results.
  4. Commissioning Authority will provide to Contractor preliminary test procedures and test data forms for performance tests and commissioning tests after approval of Product Data, Shop Drawings, and preliminary operation and maintenance manual.
  5. Review preliminary test procedures and test data forms, and provide comments within 14 days of receipt from Commissioning Authority. Review shall address the following:
    - a. Equipment protection and warranty issues, including, but not limited to, manufacturers' installation and startup recommendations, and operation and maintenance instructions.
    - b. Applicability of the procedure to the specific software, equipment, and systems approved for installation.
  6. After Contractor has reviewed and commented on the preliminary test procedures and test data forms, Commissioning Authority will revise and reissue the approved revised test procedures and test data forms marked "Approved for Testing."
  7. Use only approved test procedures and test data forms marked "Approved for Testing" to perform and document tests and test demonstrations.
- G. Performance of Tests:
1. The sampling rate for tests is 100 percent. The sampling rate for test demonstrations is 100 percent unless otherwise indicated.
  2. Perform and complete each step of the approved test procedures in the order listed.
  3. Record data observed during performance of tests on approved data forms at the time of test performance and when the results are observed.
  4. Record test results that are not within the range of acceptable results on commissioning issue report forms in addition to recording the results on approved test procedures and data forms according to the "Commissioning Compliance Issues" Paragraph in this Article.
  5. On completion of a test, sign the completed test procedure and data form. Tests for which test procedures and data forms are incomplete, not signed, or which indicate performance that does not comply with acceptance criteria will be rejected. Tests for which test procedures and data forms are rejected shall be repeated and results resubmitted.
- H. Performance of Test Demonstration:
1. Perform test demonstrations on a sample of tests after test data submittals are approved. The sampling rate for test demonstrations shall be 100 percent unless otherwise indicated in the individual test specification.
  2. Notify Owner's witness at least five days in advance of each test demonstration.
  3. Perform and complete each step of the approved test procedures in the order listed.
  4. Record data observed during performance of test demonstrations on approved data forms at the time of demonstration and when the results are observed.

5. Provide full access to Owner's witness to directly observe the performance of all aspects of system response during the test demonstration. On completion of a test demonstration, sign the completed data form and obtain signature of Owner's witness at the time of the test to authenticate the reported results.
  6. Test demonstration data forms not signed by Contractor and Owner's witness at the time of the completion of the procedure will be rejected. Test demonstrations for which data forms are rejected shall be repeated and results shall be resubmitted.
    - a. Exception for Failure of Owner's Witness to Attend: Failure of Owner's witness to be present for agreed-on schedule of test demonstration shall not delay Contractor. If Owner's witness fails to attend a scheduled test, Contractor shall proceed with the scheduled test. On completion, Contractor shall sign the data form for Contractor and for Owner's witness, and shall note the absence of Owner's witness at the scheduled time and place.
  7. False load test requirements are specified in related sections.
    - a. Where false load testing is specified, provide temporary equipment, power, controls, wiring, piping, valves, and other necessary equipment and connections required to apply the specified load to the system. False load system shall be capable of steady-state operation and modulation at the level of load specified. Equipment and systems permanently installed in this work shall not be used to create the false load without Architect's written approval.
- I. Deferred Tests:
1. Deferred Test List: Identify, in the request for Certificate of Construction-Phase Commissioning Process Completion, proposed deferred tests or other tests approved for deferral until specified seasonal or other conditions are available. When approved, deferred tests may be completed after the date of Construction-Phase Commissioning Completion. Identify proposed deferred tests in the request for Certificate of Construction-Phase Commissioning Process Completion as follows:
    - a. Identify deferred tests by number and title.
    - b. Provide a target schedule for completion of deferred tests.
  2. Schedule and coordinate deferred tests. Schedule deferred tests when specified conditions are available. Notify Architect at least three working days (minimum) in advance of tests.
  3. Where deferred tests are specified, coordinate participation of necessary personnel and of Architect, Commissioning Authority, and Owner's witness. Schedule deferred tests to minimize occupant and facility impact. Obtain Architect's approval of the proposed schedule.
- J. Delayed Tests:
1. Delayed Test List: Identify, in the request for Certificate of Construction-Phase Commissioning Process Completion, proposed delayed tests. Obtain Owner approval of proposed delayed tests, including proposed schedule of completion of each delayed test, before submitting request for Certificate of Construction-Phase Commissioning Process Completion. Include the following in the request for Certificate of Construction-Phase Commissioning Process Completion:
    - a. Identify delayed tests by test number and title.
    - b. Written approval of proposed delayed tests, including approved schedule of completion of delayed tests.
  2. Schedule and coordinate delayed tests. Schedule delayed tests when conditions that caused the delay have been rectified. Notify Architect and Commissioning Authority at least three working days (minimum) in advance of tests.

3. Where delayed tests are approved, coordinate participation of necessary personnel and of Architect, Commissioning Authority, and Owner's witness. Schedule delayed tests to minimize occupant and facility impact. Obtain Architect's approval of the proposed schedule.

K. Commissioning Compliance Issues:

1. Test results that are not within the range of acceptable results are commissioning compliance issues.
2. Track and report commissioning compliance issues until resolution and retesting are successfully completed.
3. If a test demonstration fails, determine the cause of failure. Direct timely resolution of issue and then repeat the demonstration. If a test demonstration must be repeated due to failure caused by Contractor work or materials, reimburse Owner for billed costs for the participation in the repeated demonstration.
4. Test Results: If a test demonstration fails to meet the acceptance criteria, perform the following:
  - a. Complete a commissioning compliance issue report form promptly on discovery of test results that do not comply with acceptance criteria.
  - b. Submit commissioning compliance issue report form within 24 hours of the test.
  - c. Determine the cause of the failure.
  - d. Establish responsibility for corrective action if the failure is due to conditions found to be Contractor's responsibility.
5. Commissioning Compliance Issue Report: Provide a commissioning compliance issue report for each issue. Do not report multiple issues on the same commissioning compliance issue report.
  - a. Exception: If an entire class of devices is determined to exhibit the identical issue, they may be reported on a single commissioning compliance issue report. (For example, if all return-air damper actuators that are specified to fail to the open position are found to fail to the closed position, they may be reported on a single commissioning issue report. If a single commissioning issue report is used for multiple commissioning compliance issues, each device shall be identified in the report, and the total number of devices at issue shall be identified.
  - b. Complete and submit Part 1 of the commissioning compliance issue report immediately when the condition is observed.
  - c. Record the commissioning compliance issue report number and describe the deficient condition on the data form.
  - d. Resolve commissioning compliance issues promptly. Complete and submit Part 2 of the commissioning compliance issue report when issues are resolved.
6. Diagnose and correct failed test demonstrations as follows:
  - a. Perform diagnostic tests and activities required to determine the fundamental cause of issues observed.
  - b. Record each step of the diagnostic procedure prior to performing the procedure. Update written procedure as changes become necessary.
  - c. Record the results of each step of the diagnostic procedure.
  - d. Record the conclusion of the diagnostic procedure on the fundamental cause of the issue.
  - e. Determine and record corrective measures.
  - f. Include diagnosis of fundamental cause of issues in commissioning compliance issue report.
7. Retest:

- a. Schedule and repeat the complete test procedure for each test demonstration for which acceptable results are not achieved. Obtain signature of Owner's witness on retest data forms. Repeat test demonstration until acceptable results are achieved. Except for issues that are determined to result from design errors or omissions, or other conditions beyond Contractor's responsibility, compensate Owner for direct costs incurred as the result of repeated test demonstrations to achieve acceptable results.
  - b. For each repeated test demonstration, submit a new test data form, marked "Retest."
8. Do not correct commissioning compliance issues during test demonstrations.
- a. Exceptions will be allowed if the cause of the issue is obvious and resolution can be completed in less than five minutes. If corrections are made under this exception, note the deficient conditions on the test data form and issue a commissioning compliance issue report. A new test data form, marked "Retest," shall be initiated after the resolution has been completed.

### 3.6 COMMISSIONING MEETINGS

- A. Schedule and conduct commissioning meetings. Comply with requirements in Section 01 3119 "Project Meetings."

### 3.7 SEQUENCING

- A. Sequencing of Commissioning Verification Activities: For a particular material, item of equipment, assembly, or system, perform the following in the order listed unless otherwise indicated:
  1. Construction Checklists:
    - a. Material checks.
    - b. Installation checks.
    - c. Startup, as appropriate. Some startup may depend on component performance. Such startup may follow component performance tests on which the startup depends.
    - d. Performance Tests:
      - 1) Static tests, as appropriate.
      - 2) Component performance tests. Some component performance tests may depend on completion of startup. Such component performance tests may follow startup.
      - 3) Equipment and assembly performance tests.
      - 4) System performance tests.
      - 5) Intersystem performance tests.
  2. Commissioning tests.
- B. Before performing commissioning tests, verify that materials, equipment, assemblies, and systems are delivered, installed, started, and adjusted to perform according to construction checklists.

- C. Verify readiness of materials, equipment, assemblies, and systems by performing tests prior to performing test demonstrations. Notify Architect if acceptable results cannot be achieved due to conditions beyond Contractor's control or responsibility.
- D. Commence tests as soon as installation checks for materials, equipment, assemblies, or systems are satisfactorily completed. Tests of a particular system may proceed prior to completion of other systems, provided the incomplete work does not interfere with successful execution of test.

### 3.8 SCHEDULING

- A. Commence commissioning process as early in the construction period as possible.
- B. Commissioning Schedule: Integrate commissioning activities into Construction Schedule. See Section 01 3216 "Construction Progress Schedules."
  - 1. Include detailed commissioning activities in monthly updated Construction Schedule and short-interval schedule submittals.
  - 2. Schedule the start date and duration for the following commissioning activities:
    - a. Submittals.
    - b. Preliminary operation and maintenance manual submittals.
    - c. Installation checks.
    - d. Startup, where required.
    - e. Performance tests.
    - f. Performance test demonstrations.
    - g. Commissioning tests.
    - h. Commissioning test demonstrations.
  - 3. Schedule shall include a line item for each installation check, startup, and test activity specific to the equipment or systems involved.
  - 4. Determine milestones and prerequisites for commissioning process. Show commissioning milestones, prerequisites, and dependencies in monthly updated critical-path-method construction schedule and short-interval schedule submittals.
- C. Two-Week Look-Ahead Commissioning Schedule:
  - 1. Two weeks prior to the beginning of tests, submit a detailed two-week look-ahead schedule. Thereafter, submit updated two-week look-ahead schedules weekly for the duration of commissioning process.
  - 2. Two-week look-ahead schedules shall identify the date, time, beginning location, Contractor personnel required, and anticipated duration for each startup or test activity.
  - 3. Use two-week look-ahead schedules to notify and coordinate participation of Owner's witnesses.
- D. Owner's Witness Coordination:
  - 1. Coordinate Owner's witness participation via Architect.
  - 2. Notify Architect of commissioning schedule changes at least three work days in advance for activities requiring the participation of Owner's witness.

### 3.9 COMMISSIONING REPORTS

#### A. Test Reports:

1. Pre-startup reports include observations of the conditions of installation, organized into the following sections:
  - a. Equipment Model Verification: Compare contract requirements, approved submittals, and provided equipment. Note inconsistencies.
  - b. Preinstallation Physical Condition Checks: Observe physical condition of equipment prior to installation. Note conditions including, but not limited to, physical damage, corrosion, water damage, or other contamination or dirt.
  - c. Preinstallation Component Verification Checks: Verify components supplied with the equipment, preinstalled or field installed, are correctly installed and functional. Verify external components required for proper operation of equipment correctly installed and functional. Note missing, improperly configured, improperly installed, or nonfunctional components.
  - d. Summary of Installation Compliance Issues and Corrective Actions: Identify installation compliance issues and the corrective actions for each. Verify that issues noted have been corrected.
  - e. Evaluation of System Readiness for Startup: For each item of equipment for each system for which startup is anticipated, document in summary form acceptable to Owner completion of equipment model verification, preinstallation physical condition checks, preinstallation component verification checks, and completion of corrective actions for installation compliance issues.
2. Test data reports include the following:
  - a. "As-tested" system configuration. Complete record of conditions under which the test was performed, including, but not limited to, the status of equipment, systems, and assemblies; temporary adjustments and settings; and ambient conditions.
  - b. Data and observations, including, but not limited to, data trend logs, recorded during the tests.
  - c. Signatures of individuals performing and witnessing tests.
  - d. Data trend logs accumulated overnight from the previous day of testing.
3. Commissioning Compliance Issue Reports: Report as commissioning compliance issues results of tests and test demonstrations that do not comply with acceptance criteria. Report only one issue per commissioning compliance issue report. Use sequentially numbered facsimiles of commissioning compliance issue report form included in this Section, or other form approved by Owner. Distribute commissioning compliance issue reports to parties responsible for taking corrective action. Identify the following:
  - a. Commissioning compliance issue report number. Assign unique, sequential numbers to individual commissioning compliance issue reports when they are created, to be used for tracking.
  - b. Action distribution list.
  - c. Report date.
  - d. Test number and description.
  - e. Equipment identification and location.
  - f. Briefly describe observations about the performance associated with failure to achieve acceptable results. Identify the cause of failure if apparent.
  - g. Diagnostic procedure or plan to determine the cause (include in initial submittal)
  - h. Diagnosis of fundamental cause of issues as specified below (include in resubmittal).

- i. Fundamental cause of unacceptable performance as determined by diagnostic tests and activities.
- j. When issues have been resolved, update and resubmit the commissioning issue report forms by completing Part 2. Identify resolution taken and the dates and initials of the persons making the entries.
- k. Schedule for retesting.
4. Weekly progress reports include information for tests conducted since the preceding report and the following:
  - a. Completed data forms.
  - b. Equipment or system tested, including test number, system or equipment tag number and location, and notation about the apparent acceptability of results.
  - c. Activities scheduled but not conducted per schedule.
  - d. Commissioning compliance issue report log.
  - e. Schedule changes for remaining Commissioning-Process Work, if any.
5. Data trend logs shall be initiated and running prior to the time scheduled for the test demonstration.
  - a. Trend log data format shall be multiple data series graphs. Where multiple data series are trend logged concurrently, present the data on a common horizontal time axis. Individual data series may be presented on a segmented vertical axis to avoid interference of one data series with another, and to accommodate different axis scale values. Graphs shall be sufficiently clear to interpret data within the accuracy required by the acceptance criteria.
  - b. Attach to the data form printed trend log data collected during the test or test demonstration.
  - c. Record, print out, and attach to the data form operator activity during the time the trend log is running. During the time the trend log is running, operator intervention not directed by the test procedure invalidates the test results.
6. System Alarm Logs: Record and print out a log of alarms that occurred since the last log was printed. Evaluate alarms to determine if the previous day's work resulted in any conditions that are not considered "normal operation."
  - a. Conditions that are not considered "normal operation" shall be reported on a commissioning issue report attached to the alarm log. Resolve as necessary. The intent of this requirement is to discover control system points or sequences left in manual or disabled conditions, equipment left disconnected, set points left with abnormal values, or similar conditions that may have resulted from failure to fully restore systems to normal, automatic control after test completion.

### 3.10 CERTIFICATE OF CONSTRUCTION-PHASE COMMISSIONING PROCESS COMPLETION

- A. When Contractor considers that construction-phase commissioning process, or a portion thereof which Owner agrees to accept separately, is complete, Contractor shall prepare and submit to Owner and Commissioning Authority, copying Architect a comprehensive list of items to be completed or corrected. Failure to include an item on such list does not alter Contractor's responsibility to complete commissioning process.
- B. On receipt of Contractor's list, Commissioning Authority shall make an inspection to determine whether the construction-phase commissioning process or designated portion thereof is complete. If Commissioning Authority's inspection discloses items, whether included on

Contractor's list, which is not sufficiently complete as defined in "Construction-Phase Commissioning Process Completion" Paragraph in the "Definitions" Article, Contractor shall, before issuance of the Certificate of Construction-Phase Commissioning Process Completion, complete or correct such items on notification by Commissioning Authority. In such case, Contractor shall then submit a request for another inspection by Commissioning Authority to determine construction-phase commissioning process completion.

- C. Contractor shall promptly correct deficient conditions and issues discovered during commissioning process. Costs of correcting such deficient conditions and issues, including additional testing and inspections, the cost of uncovering and replacement, and compensation for Architect's services and expenses made necessary thereby, shall be at Contractor's expense.
- D. When construction-phase commissioning process or designated portion is complete, Commissioning Authority will prepare a Certificate of Construction-Phase Commissioning Process Completion that shall establish the date of completion of construction-phase commissioning process. Certificate of Construction-Phase Commissioning Process Completion shall be submitted prior to requesting inspection for determining date of Substantial Completion.

END OF SECTION



## SECTION 02 4119 - SELECTIVE DEMOLITION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Demolition and removal of selected portions of building or structure.
  - 2. Demolition and removal of selected site elements.
  - 3. Salvage of existing items to be reused or recycled.
- B. Related Requirements:
  - 1. Section 01 1000 "Summary" for restrictions on use of the premises, Owner-occupancy requirements, and phasing requirements.
  - 2. Section 01 7329 "Cutting and Patching."

#### 1.3 DEFINITIONS

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

#### 1.4 MATERIALS OWNERSHIP

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

- B. Historic items, relics, antiques, and similar objects including, but not limited to, cornerstones and their contents, commemorative plaques and tablets, and other items of interest or value to Owner that may be uncovered during demolition remain the property of Owner.
  - 1. Carefully salvage in a manner to prevent damage and promptly return to Owner.

#### 1.5 PREINSTALLATION MEETINGS

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

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For refrigerant recovery technician.
- B. Proposed Protection Measures: Submit report, including Drawings, that indicates the measures proposed for protecting individuals and property, for environmental protection, for dust control, and for noise control. Indicate proposed locations and construction of barriers.
- C. Schedule of Selective Demolition Activities: Indicate the following:
  - 1. Detailed sequence of selective demolition and removal work, with starting and ending dates for each activity. Ensure Owner's on-site operations are uninterrupted.
  - 2. Interruption of utility services. Indicate how long utility services will be interrupted.
  - 3. Coordination for shutoff, capping, and continuation of utility services.
  - 4. Use of elevator and stairs.
  - 5. Coordination of Owner's continuing occupancy of portions of existing building and of Owner's partial occupancy of completed Work.
- D. Predemolition Photographs or Video: Show existing conditions of adjoining construction, including finish surfaces, that might be misconstrued as damage caused by demolition operations. Comply with Section 01 3233 "Photographic Documentation." Submit before Work begins.
- E. Statement of Refrigerant Recovery: Signed by refrigerant recovery technician responsible for recovering refrigerant, stating that all refrigerant that was present was recovered and that recovery was performed according to EPA regulations. Include name and address of technician and date refrigerant was recovered.
- F. Warranties: Documentation indicating that existing warranties are still in effect after completion of selective demolition.

1.7 CLOSEOUT SUBMITTALS

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

1.8 QUALITY ASSURANCE

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

1.9 FIELD CONDITIONS

- A. Owner will occupy portions of building immediately adjacent to selective demolition area. Conduct selective demolition so Owner's operations will not be disrupted.
- B. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.
- C. Notify Architect of discrepancies between existing conditions and Drawings before proceeding with selective demolition.
- D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
  - 1. If suspected hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.
- E. Storage or sale of removed items or materials on-site is not permitted.
- F. Utility Service: Maintain existing utilities indicated to remain in service and protect them against damage during selective demolition operations.
  - 1. Maintain fire-protection facilities in service during selective demolition operations.

1.10 WARRANTY

- A. Existing Warranties: Remove, replace, patch, and repair materials and surfaces cut or damaged during selective demolition, by methods and with materials and using approved contractors so as not to void existing warranties. Notify warrantor before proceeding. Existing warranties include the following:
  - 1. Roofing System.
- B. Notify warrantor on completion of selective demolition, and obtain documentation verifying that existing system has been inspected and warranty remains in effect. Submit documentation at Project closeout.

1.11 COORDINATION

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

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify that utilities have been disconnected and capped before starting selective demolition operations.
- B. Review Project Record Documents of existing construction or other existing condition and hazardous material information provided by Owner. Owner does not guarantee that existing conditions are same as those indicated in Project Record Documents.
- C. Steel Tendons: Locate tensioned steel tendons and include recommendations for de-tensioning.
- D. Survey of Existing Conditions: Record existing conditions by use of measured drawings, and preconstruction photographs or video.
  - 1. Comply with requirements specified in Section 01 3233 "Photographic Documentation."
  - 2. Inventory and record the condition of items to be removed and salvaged. Provide photographs or video of conditions that might be misconstrued as damage caused by salvage operations.
  - 3. Before selective demolition or removal of existing building elements that will be reproduced or duplicated in final Work, make permanent record of measurements, materials, and construction details required to make exact reproduction.

### 3.2 PREPARATION

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

### 3.3 UTILITY SERVICES AND MECHANICAL/ELECTRICAL SYSTEMS

- A. Existing Services/Systems to Remain: Maintain services/systems indicated to remain and protect them against damage.
- B. Existing Services/Systems to Be Removed, Relocated, or Abandoned: Locate, identify, disconnect, and seal or cap off utility services and mechanical/electrical systems serving areas to be selectively demolished.

1. Owner will arrange to shut off indicated services/systems when requested by Contractor.
2. If services/systems are required to be removed, relocated, or abandoned, provide temporary services/systems that bypass area of selective demolition and that maintain continuity of services/systems to other parts of building.
3. Disconnect, demolish, and remove fire-suppression systems, plumbing, and HVAC systems, equipment, and components indicated on Drawings to be removed.
  - a. Piping to Be Removed: Remove portion of piping indicated to be removed and cap or plug remaining piping with same or compatible piping material.
  - b. Piping to Be Abandoned in Place: Drain piping and cap or plug piping with same or compatible piping material and leave in place.
  - c. Equipment to Be Removed: Disconnect and cap services and remove equipment.
  - d. Equipment to Be Removed and Reinstalled: Disconnect and cap services and remove, clean, and store equipment; when appropriate, reinstall, reconnect, and make equipment operational.
  - e. Equipment to Be Removed and Salvaged: Disconnect and cap services and remove equipment and deliver to Owner.
  - f. Ducts to Be Removed: Remove portion of ducts indicated to be removed and plug remaining ducts with same or compatible ductwork material.
  - g. Ducts to Be Abandoned in Place: Cap or plug ducts with same or compatible ductwork material and leave in place.

#### 3.4 PROTECTION

- A. Temporary Protection: Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
  1. Provide protection to ensure safe passage of people around selective demolition area and to and from occupied portions of building.
  2. Provide temporary weather protection, during interval between selective demolition of existing construction on exterior surfaces and new construction, to prevent water leakage and damage to structure and interior areas.
  3. Protect walls, ceilings, floors, and other existing finish work that are to remain or that are exposed during selective demolition operations.
  4. Cover and protect furniture, furnishings, and equipment that have not been removed.
  5. Comply with requirements for temporary enclosures, dust control, heating, and cooling specified in Section 015000 "Temporary Facilities and Controls."
- B. Temporary Shoring: Design, provide, and maintain shoring, bracing, and structural supports as required to preserve stability and prevent movement, settlement, or collapse of construction and finishes to remain, and to prevent unexpected or uncontrolled movement or collapse of construction being demolished.
  1. Strengthen or add new supports when required during progress of selective demolition.
- C. Remove temporary barricades and protections where hazards no longer exist.

### 3.5 SELECTIVE DEMOLITION, GENERAL

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

protected storage location during selective demolition and cleaned and reinstalled in their original locations after selective demolition operations are complete.

### 3.6 SELECTIVE DEMOLITION PROCEDURES FOR SPECIFIC MATERIALS

- A. Concrete: Demolish in small sections. Using power-driven saw, cut concrete to a depth of at least 3/4 inch at junctures with construction to remain. Dislodge concrete from reinforcement at perimeter of areas being demolished, cut reinforcement, and then remove remainder of concrete. Neatly trim openings to dimensions indicated.
- B. Concrete: Demolish in sections. Cut concrete full depth at junctures with construction to remain and at regular intervals using power-driven saw, and then remove concrete between saw cuts.
- C. Masonry: Demolish in small sections. Cut masonry at junctures with construction to remain, using power-driven saw, and then remove masonry between saw cuts.
- D. Concrete Slabs-on-Grade: Saw-cut perimeter of area to be demolished, and then break up and remove.
- E. Resilient Floor Coverings: Remove floor coverings and adhesive according to recommendations in RFCI's "Recommended Work Practices for the Removal of Resilient Floor Coverings."

### 3.7 DISPOSAL OF DEMOLISHED MATERIALS

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

### 3.8 CLEANING

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

END OF SECTION



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

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
  - 1. Footings.
  - 2. Drilled pier foundations
  - 3. Foundation walls, grade beams and pier caps.
  - 4. Slabs-on-grade.
  - 5. Concrete toppings over steel deck.
- B. Related Sections:
  - 1. Division 03 Section "Structural Precast Concrete for embeds and supplemental reinforcing."
  - 2. Division 31 Section "Earth Moving" for drainage fill under slabs-on-grade.
  - 3. Division 32 Section "Concrete Paving" for concrete pavement and walks.
  - 4. Division 32 Section "Decorative Concrete Paving" for decorative concrete pavement and walks.

#### 1.3 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

#### 1.4 ACTION SUBMITTALS

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

1. Coordinate with structural precast wall panel manufacturer to included foundation embed plates, embedded anchorages and supplemental reinforcing. Items to be included and referenced on placing drawings.

D. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.

1. Location of construction joints is subject to approval of the Architect.

#### 1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

B. Material Certificates: For each of the following, signed by manufacturers:

1. Cementitious materials.
2. Admixtures.
3. Steel reinforcement and accessories.
4. Diamond Plate Dowel System
5. Fiber reinforcement.
6. Curing compounds.
7. Floor and slab treatments.
8. Bonding agents.
9. Adhesives.
10. Semirigid joint filler.
11. Joint-filler strips.
12. Repair materials.

C. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:

1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.

E. Field quality-control reports.

#### 1.6 QUALITY ASSURANCE

A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.

B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.

1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."

C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
  2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- E. Welding Qualifications: Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."
- F. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301, "Specifications for Structural Concrete," Sections 1 through 5.
  2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- G. Concrete Testing Service: Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.
- H. Preinstallation Conference: Conduct conference at Project site
1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete manufacturer.
    - d. Concrete subcontractor.
    - e. Special concrete finish subcontractor.
  2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi-rigid joint fillers, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.
- 1.7 DELIVERY, STORAGE, AND HANDLING
- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage.

## 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.

1. Plywood, metal, or other approved panel materials.
  2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
    - a. High-density overlay, Class 1 or better.
    - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
    - c. Structural 1, B-B or better; mill oiled and edge sealed.
    - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- D. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- E. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- F. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- G. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
1. Furnish units that will leave no corrodible metal closer than 1 inch (25 mm) to the plane of exposed concrete surface.
  2. Furnish ties that, when removed, will leave holes no larger than 1 inch (25 mm) in diameter in concrete surface.
  3. Furnish ties with integral water-barrier plates to walls indicated to receive dampproofing or waterproofing.

## 2.2 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 60 percent.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- C. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- D. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.

2.3 FIBER REINFORCEMENT



## SECTION 03 4100 - PRECAST STRUCTURAL CONCRETE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Precast structural concrete.
  - 2. Precast structural concrete with commercial architectural finish.
- B. Related Sections:
  - 1. Division 03 Section "Cast-in-Place Concrete" for placing connection anchors in concrete.
  - 2. Division 05 Section "Structural Steel Framing" for furnishing and installing connections attached to structural-steel framing.
  - 3. Division 05 Section "Metal Fabrications" for kickers and other miscellaneous steel shapes.
  - 4. Division 07 Section "Sheet Metal Flashing and Trim" for flashing receivers and reglets.
  - 5. Division 07 Section "Penetration Firestopping" for joint-filler materials for fire-resistance-rated construction.
  - 6. Division 07 Section "Joint Sealants" for elastomeric joint sealants and sealant backings.
  - 7. Division 23 Section "Common Work Results for HVAC" for mechanical work requirements.
  - 8. Division 26 Section "Common Work Results for Electrical" for electrical work requirements.

#### 1.3 DEFINITION

- A. Design Reference Sample: Sample of approved precast structural concrete color, finish, and texture, preapproved by Architect.

#### 1.4 PREINSTALLATION MEETINGS

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

## 1.5 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design precast structural concrete, including comprehensive engineering analysis by a structural engineer certified in the state of Arizona, contracted by the precast manufacturer. The design of precast elements shall conform to the performance requirements and design criteria indicated, and shall meet the design intent presented in the contract documents.
- B. Structural Performance: Precast structural concrete units and connections shall withstand design loads indicated on Contract Documents within limits and under conditions indicated.
- C. Structural Performance: Provide precast structural concrete units and connections capable of withstanding the design loads and criteria specified on both the contract drawings and the following design loads within limits and under conditions indicated:
  - 1. Design precast structural concrete framing system and connections to maintain clearances at openings, to allow for fabrication and construction tolerances, to accommodate live-load deflection, shrinkage and creep of primary building structure, and other building movements. Maintain precast structural concrete deflections within limits of ACI 318 (ACI 318M).
    - a. Thermal Movements: Allow for in-plane thermal movements resulting from annual ambient temperature changes of 120 deg F (67 deg C).
  - 2. Fire-Resistance Rating: Select material and minimum thicknesses to provide indicated fire rating.
  - 3. Fire-Resistance Calculations: Where indicated, provide precast structural concrete units whose fire resistance meets prescriptive requirements of authorities having jurisdiction or has been calculated according to PCI MNL 124, "Design for Fire Resistance of Precast Prestressed Concrete," and is acceptable to authorities having jurisdiction.

## 1.6 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each precast concrete mixture. Include compressive strength and water-absorption tests.
- C. Shop Drawings: Include member locations, plans, elevations, dimensions, shapes and sections, openings, support conditions, and types of reinforcement, including special reinforcement. Detail fabrication and installation of precast structural concrete units.
  - 1. Elevations of vertical precast panels in shop drawing submittals shall show necessary design intent as specified on the contract drawings.
  - 2. Indicate joints, reveals, and extent and location of each surface finish.
  - 3. Indicate separate face and backup mixture locations and thicknesses.
  - 4. Indicate welded connections by AWS standard symbols. Show size, length, and type of each weld.
  - 5. Detail loose and cast-in hardware, lifting and erection inserts, connections, and joints.
  - 6. Indicate locations, tolerances, and details of anchorage devices to be embedded in or attached to structure or other construction.

7. Include and locate openings larger than 10 inches (250 mm).
  8. Indicate location of each precast structural concrete unit by same identification mark placed on panel.
  9. Indicate relationship of precast structural concrete units to adjacent materials.
  10. Indicate shim sizes and grouting sequence.
  11. Design Modifications: If design modifications are proposed to meet performance requirements and field conditions, submit design calculations and Shop Drawings. Do not adversely affect the appearance, durability, or strength of units when modifying details or materials and maintain the general design concept.
- D. Delegated-Design Submittal: For precast structural concrete indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the licensed professional engineer responsible for their preparation.
- E. Qualification Data: For Installer, fabricator and testing agency.
- F. Welding certificates.
- G. Material Certificates: For the following, from manufacturer:
1. Cementitious materials.
  2. Reinforcing materials and prestressing tendons.
  3. Admixtures.
  4. Bearing pads.
  5. Structural-steel shapes and hollow structural sections.
- H. Material Test Reports: For aggregates.
- I. Source quality-control reports.
- J. Field quality-control and special inspection reports.

## 1.7 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm that assumes responsibility for engineering precast structural concrete units to comply with performance requirements. Responsibility includes preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.
1. Participates in PCI's Plant Certification program and is designated a PCI-certified plant as follows:
    - a. Category C1 - Precast Concrete Products (no prestressed reinforcement)
    - b. Category C2 - Prestressed Hollowcore and Repetitively Produced Products
  2. Site casting of precast structural concrete elements are required to meet the same physical and aesthetic characteristics as plant cast elements.
  3. Fabricator must be capable of producing panels meeting specified PCI tolerances. Fabricated panels that are on-site and do not meet required tolerances will be removed from site and replaced with new panels at no cost to Architect, Owner, or Owner's Representative.

- B. Installer Qualifications: A precast concrete erector qualified, as evidenced by PCI's Certificate of Compliance, to erect Category S1 - Simple Structural Systems.
  - 1. Installer must be capable of placing panels meeting specified PCI tolerances. Installed panels that do not meet required tolerances will be removed from site and replaced with new panels at no cost to Architect, Owner, or Owner's Representative.
- C. Testing Agency Qualifications: Qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
- D. Design Standards: Comply with ACI 318 (ACI 318M) and design recommendations in PCI MNL 120, "PCI Design Handbook - Precast and Prestressed Concrete," applicable to types of precast structural concrete units indicated.
- E. Quality-Control Standard: For manufacturing procedures and testing requirements, quality-control recommendations, and dimensional tolerances for types of units required, comply with PCI MNL 116, "Manual for Quality Control for Plants and Production of Structural Precast Concrete Products."
- F. Finish Standards; Comply with PCI MNL-117 "Manual for Quality Control for Plants and Production of Architectural Precast Concrete Products" applicable to finishes indicated.
- G. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1/D.1.1M, "Structural Welding Code - Steel."
  - 2. AWS D1.4, "Structural Welding Code - Reinforcing Steel."
- H. Fire-Resistance Calculations: Where indicated, provide precast structural concrete units whose fire resistance meets the prescriptive requirements of authorities having jurisdiction or has been calculated according to PCI MNL 124, "Design for Fire Resistance of Precast Prestressed Concrete," and is acceptable to authorities having jurisdiction.
- I. Mockups: After sample panel approval but before production of precast structural concrete units with architectural finish, construct full-sized mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and 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. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- J. Preinstallation Conference: Conduct conference at Project site.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Support units during shipment on nonstaining shock-absorbing material in same position as during storage.

- B. Store units with adequate bracing and protect units to prevent contact with soil, to prevent staining, and to prevent cracking, distortion, warping or other physical damage.
  - 1. Store units with dunnage across full width of each bearing point unless otherwise indicated.
  - 2. Place adequate dunnage of even thickness between each unit.
  - 3. Place stored units so identification marks are clearly visible, and units can be inspected.
- C. Handle and transport units in a position consistent with their shape and design in order to avoid excessive stresses that would cause cracking or damage.
- D. Lift and support units only at designated points shown on Shop Drawings.

## 1.9 COORDINATION

- A. Furnish loose connection hardware and anchorage items to be embedded in or attached to other construction including foundation embeds and reinforcing before starting that Work. Provide locations, setting diagrams, templates, instructions, and directions, as required, for installation.

## PART 2 - PRODUCTS

### 2.1 MOLD MATERIALS

- A. Molds: Rigid, dimensionally stable, non-absorptive material, warp and buckle free, that will provide continuous and true precast concrete surfaces within fabrication tolerances indicated; nonreactive with concrete and suitable for producing required finishes.
  - 1. Mold-Release Agent: Commercially produced liquid-release agent that will not bond with, stain or adversely affect precast concrete surfaces and will not impair subsequent surface or joint treatments of precast concrete.
- B. Surface Retarder: Chemical set retarder, capable of temporarily delaying final hardening of newly placed concrete mixture to depth of reveal specified.

### 2.2 REINFORCING MATERIALS

- A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- B. Low-Alloy-Steel Reinforcing Bars: ASTM A 706/A 706M, deformed.
- C. Plain-Steel Welded Wire Reinforcement: ASTM A 185, fabricated from as-drawn steel wire into flat sheets.
- D. Deformed-Steel Welded Wire Reinforcement: ASTM A 497/A 497M, flat sheet.

- E. Supports: Suspend reinforcement from back of mold or use bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place according to PCI MNL 116.

## 2.3 PRESTRESSING TENDONS

- A. Pretensioning Strand: ASTM A 416/A 416M, Grade 250 (Grade 1720) or Grade 270 (Grade 1860), uncoated, 7-wire, low-relaxation strand.

## 2.4 CONCRETE MATERIALS

- A. Portland Cement: ASTM C 150, Type I or Type III, gray, unless otherwise indicated.
- B. Supplementary Cementitious Materials:
  - 1. Fly Ash: ASTM C 618, Class C or F, with maximum loss on ignition of 3 percent.
- C. Normal-Weight Aggregates: Except as modified by PCI MNL 116, ASTM C 33, with coarse aggregates complying with Class 5S. Stockpile fine and coarse aggregates for each type of exposed finish from a single source (pit or quarry) for Project.
  - 1. Face-Mixture-Coarse Aggregates: Selected, hard, and durable; free of material that reacts with cement or causes staining; to match selected finish sample.
    - a. Gradation: Uniformly graded.
  - 2. Face-Mixture-Fine Aggregates: Selected, natural or manufactured sand of same material as coarse aggregate unless otherwise approved by Architect.
- D. Lightweight Aggregates: Except as modified by PCI MNL 116, ASTM C 330, with absorption less than 11 percent.
- E. Water: Potable; free from deleterious material that may affect color stability, setting, or strength of concrete and complying with chemical limits of PCI MNL 116.
- F. Air-Entraining Admixture: ASTM C 260, certified by manufacturer to be compatible with other required admixtures.
- G. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and to not contain calcium chloride, or more than 0.15 percent chloride ions or other salts by weight of admixture.
  - 1. Water-Reducing Admixtures: 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. Water-Reducing and Accelerating Admixture: ASTM C 494/C 494M, Type E.
  - 5. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  - 6. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  - 7. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M.

## 2.5 STEEL CONNECTION MATERIALS

- A. Carbon-Steel Shapes and Plates: ASTM A 36/A 36M.
- B. Carbon-Steel-Headed Studs: ASTM A 108, AISI 1018 through AISI 1020, cold finished, AWS D1.1/D1.1M, Type A or B, with arc shields and with minimum mechanical properties of PCI MNL 116.
- C. Carbon-Steel Plate: ASTM A 283/A 283M.
- D. Malleable-Iron Castings: ASTM A 47/A 47M.
- E. Carbon-Steel Castings: ASTM A 27/A 27M, Grade 60-30 (Grade 415-205).
- F. High-Strength, Low-Alloy Structural Steel: ASTM A 572/A 572M.
- G. Carbon-Steel Structural Tubing: ASTM A 500, Grade B.
- H. Wrought Carbon-Steel Bars: ASTM A 675/A 675M, Grade 65 (Grade 450).
- I. Deformed-Steel Wire or Bar Anchors: ASTM A 496 or ASTM A 706/A 706M.
- J. Carbon-Steel Bolts and Studs: ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); carbon-steel, hex-head bolts and studs; carbon-steel nuts, ASTM A 563 (ASTM A 563M); and flat, unhardened steel washers, ASTM F 844.
- K. High-Strength Bolts and Nuts: ASTM A 325 (ASTM A 325M) or ASTM A 490 ((ASTM A 490M),) Type 1, heavy hex steel structural bolts; heavy hex carbon-steel nuts, ASTM A 563 (ASTM A 563M); and hardened carbon-steel washers, ASTM F 436 (ASTM F 436M).
  - 1. Do not zinc coat ASTM A 490 (ASTM A 490M) bolts.
- L. Zinc-Coated Finish: For exterior steel items and items indicated for galvanizing, apply zinc coating by hot-dip process according to ASTM A 123/A 123M or ASTM A 153/A 153M.
  - 1. For steel shapes, plates, and tubing to be galvanized, limit silicon content of steel to less than 0.03 percent or to between 0.15 and 0.25 percent or limit sum of silicon and 2.5 times phosphorous content to 0.09 percent.
  - 2. Galvanizing Repair Paint: High-zinc-dust-content paint with dry film containing not less than 94 percent zinc dust by weight, and complying with DOD-P-21035B or SSPC-Paint 20.
- M. Shop-Primed Finish: Prepare surfaces of nongalvanized-steel items, except those surfaces to be embedded in concrete, according to requirements in SSPC-SP 3, and shop apply lead- and chromate-free, rust-inhibitive primer, complying with performance requirements in MPI 79 according to SSPC-PA 1.
- N. Welding Electrodes: Comply with AWS standards.

- O. Precast Accessories: Provide clips, hangers, plastic or steel shims, and other accessories required to install precast structural concrete units.

## 2.6 BEARING PADS

- A. Provide one of the following bearing pads for precast structural concrete units as recommended by precast fabricator for application:
  1. Elastomeric Pads: AASHTO M 251, plain, vulcanized, 100 percent polychloroprene (neoprene) elastomer, molded to size or cut from a molded sheet, 50 to 70 Shore, Type A durometer hardness, ASTM D 2240; minimum tensile strength 2250 psi (15.5 MPa), ASTM D 412.
  2. Random-Oriented, Fiber-Reinforced Elastomeric Pads: Preformed, randomly oriented synthetic fibers set in elastomer. 70 to 90 Shore, Type A durometer hardness, ASTM D 2240; capable of supporting a compressive stress of 3000 psi (20.7 MPa) with no cracking, splitting, or delaminating in the internal portions of pad. Test 1 specimen for every 200 pads used in Project.
  3. Cotton-Duck-Fabric-Reinforced Elastomeric Pads: Preformed, horizontally layered cotton-duck fabric bonded to an elastomer; 80 to 100 Shore, Type A durometer hardness, ASTM D 2240; complying with AASHTO's "AASHTO Load and Resistance Factor Design (LRFD) Bridge Specifications," Division II, Section 18.10.2; or with MIL-C-882E.
  4. High-Density Plastic: Multimonomer, nonleaching, plastic strip.

## 2.7 GROUT MATERIALS

- A. Sand-Cement Grout: Portland cement, ASTM C 150, Type I, and clean, natural sand, ASTM C 144 or ASTM C 404. Mix at ratio of 1 part cement to 2-1/2 parts sand, by volume, with minimum water required for placement and hydration.
- B. Nonmetallic, Nonshrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C 1107, Grade A for drypack and Grades B and C for flowable grout and of consistency suitable for application within a 30-minute working time.

## 2.8 CONCRETE MIXTURES

- A. Prepare design mixtures for each type of precast concrete required.
  1. Limit use of fly ash to 25 percent replacement of portland cement by weight.
- B. Design mixtures may be prepared by a qualified independent testing agency or by qualified precast plant personnel at precast structural concrete fabricator's option.
- C. Limit water-soluble chloride ions to maximum percentage by weight of cement permitted by ACI 318 (ACI 318M) or PCI MNL 116 when tested according to ASTM C 1218/C 1218M.

- D. Normal-Weight Concrete Mixtures: Proportion face and backup mixtures or full-depth mixtures, at fabricator's option by either laboratory trial batch or field test data methods according to ACI 211.1, with materials to be used on Project, to provide normal-weight concrete with the following properties:
  - 1. Compressive Strength (28 Days): 5000 psi (34.5 MPa).
  - 2. Maximum Water-Cementitious Materials Ratio: 0.45.
- E. Water Absorption: 6 percent by weight or 14 percent by volume, tested according to PCI MNL 116.
- F. Lightweight Concrete Mixtures: Proportion mixtures by either laboratory trial batch or field test data methods according to ACI 211.2, with materials to be used on Project, to provide lightweight concrete with the following properties:
  - 1. Compressive Strength (28 Days): 5000 psi (34.5 MPa).
  - 2. Unit Weight: Calculated equilibrium unit weight of 115 lb/cu. ft. (1842 kg/cu. m), plus or minus 3 lb/cu. ft. (48 kg/cu. m), according to ASTM C 567.
- G. Add air-entraining admixture at manufacturer's prescribed rate to result in concrete at point of placement having an air content complying with PCI MNL 116.
- H. When included in design mixtures, add other admixtures to concrete mixtures according to manufacturer's written instructions.
- I. Concrete Mix Adjustments: Concrete mix design adjustments may be proposed if characteristics of materials, Project conditions, weather, test results, or other circumstances warrant.

## 2.9 MOLD FABRICATION

- A. Molds: Accurately construct molds, mortar tight, of sufficient strength to withstand pressures due to concrete-placement operations and temperature changes and for prestressing and detensioning operations. Coat contact surfaces of molds with release agent before reinforcement is placed. Avoid contamination of reinforcement and prestressing tendons by release agent.
  - 1. Place form liners accurately to provide finished surface texture indicated. Provide solid backing and supports to maintain stability of liners during concrete placement. Coat form liner with form-release agent.
- B. Maintain molds to provide completed precast structural concrete units of shapes, lines, and dimensions indicated, within fabrication tolerances specified.
  - 1. Form joints are not permitted on faces exposed to view in the finished work.
  - 2. Edge and Corner Treatment: Uniformly chamfered.

2.10 FABRICATION

- A. Cast-in Anchors, Inserts, Plates, Angles, and Other Anchorage Hardware: Fabricate anchorage hardware with sufficient anchorage and embedment to comply with design requirements. Accurately position for attachment of loose hardware, and secure in place during precasting operations. Locate anchorage hardware where it does not affect position of main reinforcement or concrete placement.
  - 1. Weld-headed studs and deformed bar anchors used for anchorage according to AWS D1.1/D1.1M and AWS C5.4, "Recommended Practices for Stud Welding."
- B. Furnish loose hardware items including steel plates, clip angles, seat angles, anchors, dowels, cramps, hangers, and other hardware shapes for securing precast structural concrete units to supporting and adjacent construction.
- C. Cast-in reglets, slots, holes, and other accessories in precast structural concrete units as indicated on the Contract Drawings.
- D. Cast-in openings larger than 10 inches (250 mm) in any dimension. Do not drill or cut openings or prestressing strand without Architect's approval.
- E. Reinforcement: Comply with recommendations in PCI MNL 116 for fabricating, placing, and supporting reinforcement.
  - 1. Clean reinforcement of loose rust and mill scale, earth, and other materials that reduce or destroy the bond with concrete. When damage to epoxy-coated reinforcement exceeds limits specified, repair with patching material compatible with coating material and epoxy coat bar ends after cutting.
  - 2. Accurately position, support, and secure reinforcement against displacement during concrete-placement and consolidation operations. Completely conceal support devices to prevent exposure on finished surfaces.
  - 3. Place reinforcement to maintain at least 3/4-inch (19-mm) minimum coverage. Increase cover requirements according to ACI 318 (ACI 318M) when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
  - 4. Place reinforcing steel and prestressing strand to maintain at least 3/4-inch (19-mm) minimum concrete cover. Increase cover requirements for reinforcing steel to 1-1/2 inches (38 mm) when units are exposed to corrosive environment or severe exposure conditions. Arrange, space, and securely tie bars and bar supports to hold reinforcement in position while placing concrete. Direct wire tie ends away from finished, exposed concrete surfaces.
  - 5. Install welded wire fabric in lengths as long as practicable. Lap adjoining pieces at least one full mesh spacing and wire tie laps, where required by design. Offset laps of adjoining widths to prevent continuous laps in either direction.
- F. Reinforce precast structural concrete units to resist handling, transportation, and erection stresses.

- G. Prestress tendons for precast structural concrete units by either pretensioning or post-tensioning methods. Comply with PCI MNL 116.
  - 1. Delay detensioning or post-tensioning of precast, prestressed structural concrete units until concrete has reached its indicated minimum design release compressive strength as established by test cylinders cured under same conditions as concrete.
  - 2. Detension pretensioned tendons either by gradually releasing tensioning jacks or by heat cutting tendons, using a sequence and pattern to prevent shock or unbalanced loading.
  - 3. If concrete has been heat cured, detension while concrete is still warm and moist to avoid dimensional changes that may cause cracking or undesirable stresses.
  - 4. Protect strand ends and anchorages with bituminous, zinc-rich, or epoxy paint to avoid corrosion and possible rust spots.
  - 5. Protect strand ends and anchorages with a minimum of 1-inch- (25-mm-) thick, nonmetallic, nonshrink, grout mortar and sack rub surface. Coat or spray the inside surfaces of pocket with bonding agent before installing grout.
- H. Comply with requirements in PCI MNL 116 and in this Section for measuring, mixing, transporting, and placing concrete. After concrete batching, no additional water may be added.
- I. Place face mixture to a minimum thickness after consolidation of the greater of 1 inch (25 mm) or 1.5 times the maximum aggregate size, but not less than the minimum reinforcing cover specified.
- J. Place concrete in a continuous operation to prevent seams or planes of weakness from forming in precast concrete units.
  - 1. Place backup concrete mixture to ensure bond with face-mixture concrete.
- K. Thoroughly consolidate placed concrete by internal and external vibration without dislocating or damaging reinforcement and built-in items, and minimize pour lines, honeycombing, or entrapped air on surfaces. Use equipment and procedures complying with PCI MNL 116.
  - 1. Place self-consolidating concrete without vibration according to PCI TR-6, "Interim Guidelines for the Use of Self-Consolidating Concrete in Precast/Prestressed Concrete Institute Member Plants."
- L. Comply with ACI 306.1 procedures for cold-weather concrete placement.
- M. Comply with PCI MNL 116 procedures for hot-weather concrete placement.
- N. Identify pickup points of precast structural concrete units and orientation in structure with permanent markings, complying with markings indicated on approved Shop Drawings. Imprint or permanently mark casting date on each precast structural concrete unit on a surface that will not show in finished structure.
- O. Cure concrete, according to requirements in PCI MNL 116, by moisture retention without heat or by accelerated heat curing using low-pressure live steam or radiant heat and moisture. Cure units until compressive strength is high enough to ensure that stripping does not have an effect on performance or appearance of final product.

- P. Discard and replace precast structural concrete units that do not comply with requirements, including structural, manufacturing tolerance, and appearance, unless repairs meet requirements in PCI MNL 116 and meet Architect's approval.

## 2.11 FABRICATION TOLERANCES

- A. Fabricate precast structural concrete units straight and true to size and shape with exposed edges and corners precise and true so each finished unit complies with PCI MNL 116 product dimension tolerances.

## 2.12 COMMERCIAL FINISHES

- A. Standard Grade Finish (Furred Interior): Small surface holes caused by air bubbles, normal color variations, normal form joint marks, and minor chips and spalls shall be acceptable.
  - 1. No air holes larger than 1/2 inch in any direction are permitted. Finished surface shall be true to plane as required for proper installation of furring members.
- B. Grade A Finish (Exposed): Fill surface blemishes with the exception of air holes 1/16 inch (1.6 mm) in width or smaller, and form marks where the surface deviation is less than 1/16 inch (1.6 mm). Float apply a neat cement-paste coating to exposed surfaces. Rub dried paste coat with burlap to remove loose particles. Discoloration at form joints is permitted. Grind smooth all form joints.
  - 1. Unacceptable Finish Conditions For Grade A Finish: Except as approved by Architect-Engineer, the following is a list of finish defects that are to be corrected at the manufacturing plant prior to shipping to the job site.
    - a. Ragged or irregular edges at window and door openings, reveals and panel edges.
    - b. Air pockets, voids, or depressions that are 1/4 inch (6 mm) or larger which exceed 1 in a one square foot area.
    - c. Air pockets or voids smaller than 1/4 inch (6 mm) that exceed 10 per square foot of surface area.
    - d. Rust staining on surface.
    - e. Cast-in items that are out of level in excess of 1/8 inch per foot.
- C. Screed or float finish unformed surfaces. Strike off and consolidate concrete with vibrating screeds to a uniform finish. Hand screed at projections. Normal color variations, minor indentations, minor chips, and spalls are permitted. Major imperfections, honeycombing, or defects are not permitted.
- D. Smooth, steel trowel finish unformed surfaces. Consolidate concrete, bring to proper level with straightedge, float, and trowel to a smooth, uniform finish.
- E. Precast Wall Panels:
  - 1. Type: Plant-fabricated, precast wall panel consisting of a reinforced concrete.
  - 2. Finish:
    - a. Exterior: Grade A finish minimum exposed to view surfaces and surfaces indicated to be painted, including door and window openings.

- b. Interior (Exposed to View): Grade A finish minimum exposed to view surfaces and surfaces indicated to be painted, including door and window openings.
- c. Interior (Furred Walls): Standard Grade finish.
3. Reinforce units to resist transportation and erection stresses.
4. Include cast-in weld plates where required.
5. Coordinate with other trades for installation of cast-in items.
6. Install dovetail anchor slots in vertical position where masonry walls abut wall panels and other at locations shown on the reviewed Shop Drawings.

## 2.13 SOURCE QUALITY CONTROL

- A. Testing Agency: Engage a qualified testing agency to evaluate precast structural concrete fabricator's quality-control and testing methods.
  1. Allow testing agency access to material storage areas, concrete production equipment, concrete placement, and curing facilities. Cooperate with testing agency and provide samples of materials and concrete mixtures as may be requested for additional testing and evaluation.
- B. Testing: Test and inspect precast structural concrete according to PCI MNL 116 requirements.
  1. Test and inspect self-consolidating concrete according to PCI TR-6.
- C. Strength of precast structural concrete units will be considered deficient if units fail to comply with ACI 318 (ACI 318M) requirements for concrete strength.
- D. If there is evidence that strength of precast concrete units may be deficient or may not comply with ACI 318 (ACI 318M) requirements, employ a qualified testing agency to obtain, prepare, and test cores drilled from hardened concrete to determine compressive strength according to ASTM C 42/C 42M.
  1. A minimum of three representative cores will be taken from units of suspect strength, from locations directed by Architect.
  2. Cores will be tested in an air-dry condition or, if units will be wet under service conditions, test cores after immersion in water in a wet condition.
  3. Strength of concrete for each series of 3 cores will be considered satisfactory if average compressive strength is equal to at least 85 percent of 28-day design compressive strength and no single core is less than 75 percent of 28-day design compressive strength.
  4. Test results will be made in writing on same day that tests are performed, with copies to Architect, Contractor, and precast concrete fabricator. Test reports will include the following:
    - a. Project identification name and number.
    - b. Date when tests were performed.
    - c. Name of precast concrete fabricator.
    - d. Name of concrete testing agency.
    - e. Identification letter, name, and type of precast concrete unit(s) represented by core tests; design compressive strength; type of break; compressive strength at breaks, corrected for length-diameter ratio; and direction of applied load to core in relation to horizontal plane of concrete as placed.

- E. Patching: If core test results are satisfactory and precast structural concrete units comply with requirements, clean and dampen core holes and solidly fill with same precast concrete mixture that has no coarse aggregate, and finish to match adjacent precast concrete surfaces.
- F. Defective Units: Discard and replace precast structural concrete units that do not comply with requirements, including strength, manufacturing tolerances, and color and texture range. Chipped, spalled, or cracked units may be repaired, subject to Architect's approval. Architect reserves the right to reject precast units that do not match approved samples, sample panels, and mockups.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine supporting structural frame or foundation and conditions for compliance with requirements for installation tolerances, true and level bearing surfaces, and other conditions affecting performance of the Work.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.
- C. Do not install precast concrete units until supporting, cast-in-place, building structural framing has attained minimum allowable design compressive strength or until supporting steel or other structure is complete.

#### 3.2 INSTALLATION

- A. Install clips, hangers, bearing pads, and other accessories required for connecting precast structural concrete units to supporting members and backup materials.
- B. Erect precast structural concrete level, plumb, and square within specified allowable tolerances. Provide temporary structural framing, supports, and bracing as required to maintain position, stability, and alignment of units until permanent connection.
  - 1. Install temporary steel or plastic spacing shims or bearing pads as precast structural concrete units are being erected. Tack weld steel shims to each other to prevent shims from separating.
  - 2. Maintain horizontal and vertical joint alignment and uniform joint width as erection progresses.
  - 3. Remove projecting lifting devices and grout fill voids within recessed lifting devices flush with surface of adjacent precast surfaces when recess is exposed.
- C. Connect precast structural concrete units in position by bolting, welding, grouting, or as otherwise indicated on Shop Drawings. Remove temporary shims, wedges, and spacers as soon as practical after connecting and grouting are completed.
  - 1. Do not permit connections to disrupt continuity of roof flashing.

- D. Field cutting of precast units is not permitted without approval of the Architect.
- E. Fasteners: Do not use drilled or powder-actuated fasteners for attaching accessory items to precast, prestressed concrete units.
- F. Welding: Comply with applicable AWS D1.1/D1.1M and AWS D1.4 for welding, welding electrodes, appearance, quality of welds, and methods used in correcting welding work.
  - 1. Protect precast structural concrete units and bearing pads from damage by field welding or cutting operations, and provide noncombustible shields as required.
  - 2. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and apply a minimum 4.0-mil- (0.1-mm-) thick coat of galvanized repair paint to galvanized surfaces according to ASTM A 780.
  - 3. Clean weld-affected steel surfaces with chipping hammer followed by brushing, and reprime damaged painted surfaces.
  - 4. Remove, reweld, or repair incomplete and defective welds.
- G. At bolted connections, use lock washers, tack welding, or other approved means to prevent loosening of nuts after final adjustment.
  - 1. Where slotted connections are used, verify bolt position and tightness. For sliding connections, properly secure bolt but allow bolt to move within connection slot. For friction connections, apply specified bolt torque and check 25 percent of bolts at random by calibrated torque wrench.
- H. Grouting: Grout connections and joints and open spaces at keyways, connections, and joints where required or indicated on Shop Drawings. Retain grout in place until hard enough to support itself. Pack spaces with stiff grout material, tamping until voids are completely filled.
  - 1. Place grout to finish smooth, level, and plumb with adjacent concrete surfaces.
  - 2. Fill joints completely without seepage to other surfaces.
  - 3. Trowel top of grout joints on roofs smooth and uniform. Finish transitions between different surface levels not steeper than 1 to 12.
  - 4. Promptly remove grout material from exposed surfaces before it affects finishes or hardens.
  - 5. Keep grouted joints damp for not less than 24 hours after initial set.

### 3.3 ERECTION TOLERANCES

- A. Erect precast structural concrete units level, plumb, square, true, and in alignment without exceeding the noncumulative erection tolerances of PCI MNL 135.
- B. Minimize variations between adjacent slab members by jacking, loading, or other method recommended by fabricator and approved by Architect.

### 3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
  - 1. Erection of precast structural concrete members.
- B. Field welds will be visually inspected and nondestructive tested according to ASTM E 165 or ASTM E 709. High-strength bolted connections will be subject to inspections.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Repair or remove and replace work where tests and inspections 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.
- F. Prepare test and inspection reports.

### 3.5 REPAIRS

- A. Repair precast structural concrete units if permitted by Architect.
  - 1. Repairs may be permitted if structural adequacy, serviceability, durability, and appearance of units has not been impaired.
- B. Mix patching materials and repair units so cured patches blend with color, texture, and uniformity of adjacent exposed surfaces and show no apparent line of demarcation between original and repaired work, when viewed in typical daylight illumination from a distance of 20 feet (6 m).
- C. Prepare and repair damaged galvanized coatings with galvanizing repair paint according to ASTM A 780.
- D. Wire brush, clean, and paint damaged prime-painted components with same type of shop primer.
- E. Remove and replace damaged precast structural concrete units that cannot be repaired or when repairs do not comply with requirements as determined by Architect, whether specified or PCI manual referenced.

### 3.6 CLEANING

- A. Clean mortar, plaster, fireproofing, weld slag, and other deleterious material from concrete surfaces and adjacent materials immediately.

- B. Clean exposed surfaces of precast concrete units after erection and completion of joint treatment to remove weld marks, other markings, dirt, and stains.
  - 1. Perform cleaning procedures, if necessary, according to precast concrete fabricator's written recommendations. Clean soiled precast concrete surfaces with detergent and water, using stiff fiber brushes and sponges, and rinse with clean water. Protect other work from staining or damage due to cleaning operations.
  - 2. Do not use cleaning materials or processes that could change the appearance of exposed concrete finishes or damage adjacent materials.

END OF SECTION



SECTION 04 2200 - CONCRETE UNIT MASONRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. Section Includes:
  - 1. Concrete masonry units.
  - 2. Decorative concrete masonry units.
  - 3. Mortar and grout.
  - 4. Steel reinforcing bars.
  - 5. Masonry joint reinforcement.
  - 6. Ties and anchors.
  - 7. 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 PERFORMANCE REQUIREMENTS

- A. Provide structural unit masonry that develops indicated net-area compressive strengths at 28 days.
  - 1. Determine net-area compressive strength of masonry from average net-area compressive strengths of masonry units and mortar types (unit-strength method) according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For the following:
  - 1. Masonry Units: Show sizes, profiles, coursing, and locations of special shapes.
  - 2. Reinforcing Steel: Detail bending and placement of unit masonry reinforcing bars. Comply with ACI 315, "Details and Detailing of Concrete Reinforcement." Show elevations of reinforced walls.

1.6 INFORMATIONAL SUBMITTALS

- A. List of Materials Used in Constructing Mockups: List generic product names together with manufacturers, manufacturers' product names, model numbers, lot numbers, batch numbers,

source of supply, and other information as required to identify materials used. Include mix proportions for mortar and grout and source of aggregates.

1. Submittal is for information only. Neither receipt of list nor approval of mockup constitutes approval of deviations from the Contract Documents unless such deviations are specifically brought to the attention of Architect and approved in writing.

B. Qualification Data: For testing agency.

C. Material Certificates: For each type and size of the following:

1. Masonry units.
  - a. Include data on material properties material test reports substantiating compliance with requirements.
  - b. For masonry units used in structural masonry, include data and calculations establishing average net-area compressive strength of units.
2. Cementitious materials. Include brand, type, and name of manufacturer.
3. Preblended, dry mortar mixes. Include description of type and proportions of ingredients.
4. Grout mixes. Include description of type and proportions of ingredients.
5. Reinforcing bars.
6. Joint reinforcement.
7. Anchors, ties, and metal accessories.

D. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.

1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91 for air content.
2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

E. Statement of Compressive Strength of Masonry: For each combination of masonry unit type and mortar type, provide statement of average net-area compressive strength of masonry units, mortar type, and resulting net-area compressive strength of masonry determined according to Tables 1 and 2 in ACI 530.1/ASCE 6/TMS 602.

F. Cold-Weather and Hot-Weather Procedures: Detailed description of methods, materials, and equipment to be used to comply with requirements.

## 1.7 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to ASTM C 1093 for testing indicated.

B. 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.

C. 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.

- D. Masonry Standard: Comply with ACI 530.1/ASCE 6/TMS 602 unless modified by requirements in the Contract Documents.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

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

#### 1.9 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.
  - 1. Extend cover a minimum of 24 inches (600 mm) down both sides of walls and hold cover securely in place.
- B. Do not apply uniform floor or roof loads for at least 12 hours and concentrated loads for at least three days after building masonry walls or columns.
- C. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry to be left exposed or painted. Immediately remove grout, mortar, and soil that come in contact with such masonry.
  - 1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
  - 2. 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.
- D. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in ACI 530.1/ASCE 6/TMS 602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is 40 deg F (4 deg C) and higher and will remain so until masonry has dried, but not less than 7 days after completing cleaning.
- E. 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 CONCRETE MASONRY UNITS**

- A. Regional Materials: CMUs shall be manufactured within 500 miles (800 km) of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
- B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  1. Provide special shapes for corners, jambs, movement joints, headers, bonding, and other special conditions.
  2. Provide square-edged units for outside corners unless otherwise indicated.
- C. CMUs: ASTM C 90.
  1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 PSI.
  2. Density Classification: Medium weight.
  3. Size (Width): Manufactured to dimensions 3/8 inch less than nominal dimensions.
  4. Exposed Faces: Provide color and texture matching the range represented by Architect's sample.

<b>WEIGHT CLASS</b>	<b>TYPE</b>	<b>SIZE w x h x l</b>	<b>TEXTURE</b>	<b>COLOR</b>	<b>MANUFACTURER</b>
Medium	CMU-1	8 x 8 x 16	Standard	Standard grey	Superlite

- D. Decorative CMUs: ASTM C 90.
  1. Products: Subject to compliance with requirements, provide the following:
    - a. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi (14.8 MPa).
  2. Density Classification: Medium weight.
  3. Size (Width): Manufactured to dimensions specified in "CMUs" Paragraph.
  4. Pattern and Texture:

- a. Standard pattern, smooth finish as indicated on the landscape details and elevations.

## 2.3 MORTAR AND GROUT MATERIALS

- A. Regional Materials: Aggregate for mortar and grout, cement, and lime shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
- B. Portland Cement: ASTM C 150, Type I or II, except Type III may be used for cold-weather construction.
- 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: Potable.

## 2.4 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. All Walls: Hot-dip galvanized, carbon steel.
  2. Wire Size for Side Rods: 0.148-inch (3.77-mm).
  3. Wire Size for Cross Rods: 0.148-inch (3.77-mm).
  4. Spacing of Cross Rods, Tabs, and Cross Ties: Not more than 16 inches (407 mm) o.c.
  5. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.
- C. Masonry Joint Reinforcement for Single-Wythe Masonry: Ladder type with single pair of side rods.

## 2.5 TIES AND ANCHORS

- A. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated.
  1. Hot-Dip Galvanized, Carbon-Steel Wire: ASTM A 82/A 82M; with ASTM A 153/A 153M, Class B-2 coating.
  2. Galvanized Steel Sheet: ASTM A 653/A 653M, Commercial Steel, G60 (Z180) zinc coating.
  3. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.

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

## 2.6 MISCELLANEOUS ANCHORS

- A. Anchor Bolts: Headed steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers; hot-dip galvanized to comply with ASTM A 153/A 153M, Class C; of dimensions indicated.

## 2.7 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, provide one of 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.

## 2.8 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
  1. Do not use calcium chloride in mortar or grout.
  2. Use portland cement-lime or mortar cement mortar unless otherwise indicated.
- B. Preblended, Dry Mortar Mix: Furnish dry mortar ingredients in form of a preblended mix. Measure quantities by weight to ensure accurate proportions, and thoroughly blend ingredients before delivering to Project site.
- C. Mortar for Unit Masonry: Comply with ASTM 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 all masonry, use Type S

- D. Grout for Unit Masonry: Comply with ASTM C 476.
1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with 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. Build chases and recesses to accommodate items specified in this and other Sections.
- B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.
- C. Use full-size units without cutting if possible. If cutting is required to provide a continuous pattern or to fit adjoining construction, cut units with motor-driven saws; provide clean, sharp, unchipped edges. Allow units to dry before laying unless wetting of units is specified. Install cut units with cut surfaces and, where possible, cut edges concealed.

#### 3.3 TOLERANCES

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

1. For bed joints and top surfaces of bearing walls do not vary from level by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.
2. For conspicuous horizontal lines, do not vary from level by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
3. For vertical lines and surfaces do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
4. For conspicuous vertical lines, such as external corners, door jambs, reveals, and expansion and control joints, do not vary from plumb by more than 1/8 inch in 10 feet (3 mm in 3 m), 1/4 inch in 20 feet (6 mm in 6 m), or 1/2 inch (12 mm) maximum.
5. For lines and surfaces do not vary from straight by more than 1/4 inch in 10 feet (6 mm in 3 m), 3/8 inch in 20 feet (9 mm in 6 m), or 1/2 inch (12 mm) maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more than 1/4 inch in 10 feet (6 mm in 3 m), or 1/2 inch (12 mm) maximum.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm), with a maximum thickness limited to 1/2 inch (12 mm).
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than 1/8 inch (3 mm).
3. For head and collar joints, do not vary from thickness indicated by more than plus 3/8 inch (9 mm) or minus 1/4 inch (6 mm).
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

3.4 LAYING MASONRY WALLS

- A. Lay out walls in advance for accurate spacing of surface bond patterns with uniform joint thicknesses and for accurate location of openings, movement-type joints, returns, and offsets. Avoid using less-than-half-size units, particularly at corners, jambs, and, where possible, at other locations.
- B. Bond Pattern for Exposed Masonry: Unless otherwise indicated, lay exposed masonry in running bond; do not use units with less than nominal 4-inch (100-mm) horizontal face dimensions at corners or jambs.
- C. Lay concealed masonry with all units in a wythe in running bond or bonded by lapping not less than 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.
- D. 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.
- E. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- F. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

- G. Where built-in items are to be embedded in cores of hollow masonry units, place a layer of metal lath, wire mesh, or plastic mesh in the joint below and rod mortar or grout into core.
- H. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, posts, and similar items unless otherwise indicated.
- I. Build non-load-bearing interior partitions full height of story to underside of solid floor or roof structure above unless otherwise indicated.
  - 1. Install top of wall supports as indicated on the drawings.
  - 2. At fire-rated partitions, treat joint between top of partition and underside of structure above to comply with Division 07 Section "Fire-Resistive Joint Systems."

### 3.5 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 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.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

### 3.6 MASONRY JOINT REINFORCEMENT

- A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
  - 1. Space reinforcement not more than 16 inches (406 mm) o.c.
  - 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 in addition to continuous reinforcement.
- B. Interrupt joint reinforcement at control unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.

### 3.7 CONTROL AND EXPANSION JOINTS

- A. General: Install control and expansion joint materials in unit masonry as masonry progresses. Do not allow materials to span control and expansion joints without provision to allow for in-plane wall or partition movement.
- B. Form control joints in concrete masonry using one of the following methods:
  - 1. Fit bond-breaker strips into hollow contour in ends of CMUs on one side of control joint. Fill resultant core with grout and rake out joints in exposed faces for application of sealant.
  - 2. Install 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.

### 3.8 REINFORCED UNIT MASONRY INSTALLATION

- A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
  - 1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
  - 2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and other loads that may be placed on them 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.
  - 2. Limit height of vertical grout pours to not more than 60 inches (1520 mm).

### 3.9 FIELD QUALITY CONTROL

- A. Testing and Inspecting: 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. Inspections: Level 1 special inspections according to the "International Building Code."
  - 1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.
  - 2. Place grout only after inspectors have verified compliance of grout spaces and of grades, sizes, and locations of reinforcement.
  - 3. Place grout only after inspectors have verified proportions of site-prepared grout.

- C. Testing Prior to Construction: One set of tests.
- D. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.
- E. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.
- F. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
- G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

### 3.10 REPAIRING, POINTING, AND CLEANING

- A. Remove and replace masonry units that are loose, chipped, broken, stained, or otherwise damaged or that do not match adjoining units. Install new units to match adjoining units; install in fresh mortar, pointed to eliminate evidence of replacement.
- B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.
- C. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- D. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
  - 2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
  - 3. Protect adjacent non-masonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
  - 4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
  - 5. Clean concrete masonry by cleaning method indicated in NCMA TEK 8-2A applicable to type of stain on exposed surfaces.

### 3.11 MASONRY WASTE DISPOSAL

- A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of unit masonry work, remove from Project site.
- B. Excess Masonry Waste: Remove excess clean masonry waste, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION



## SECTION 05 1200 - STRUCTURAL STEEL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Structural steel.
  - 2. Field-installed shear connectors.
  - 3. Grout.
- B. Related Requirements:
  - 1. Section 03 4100 "Precast Structural Concrete" for attachment to structural-steel framing.
  - 2. Section 05 3100 "Steel Decking" for field installation of shear connectors through deck.
  - 3. Section 05 5000 "Metal Fabrications" for miscellaneous steel fabrications and other steel items not defined as structural steel.
  - 4. Section 09 9100 "Painting" for surface-preparation and priming requirements.

#### 1.3 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 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.

#### 1.4 PREINSTALLATION MEETINGS

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

#### 1.5 ACTION SUBMITTALS

- A. 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.

- B. 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 qualified by testing, 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 Installer, and fabricator.
  - 1. Fabricator Qualifications: Reference section 1.7.A, "Quality Assurance".
    - a. AISC Quality Certification Program: Submit documentation with initial shop drawing submittal as follows:
      - 1) Copy of AISC Certification Certificate.
    - b. In-Plant Special Inspections: Submit documentation with initial shop drawing submittal as follows:
      - 1) Name of special inspection agency and personnel performing inspections.
      - 2) Name and qualifications of "Engineer of Record for In-Plant Special Inspections responsible for review and submission of final signed and sealed inspection report.
      - 3) Distribution list for Inspection Reports.
  - 2. Installer Qualifications: Reference section 1.7.B, "Quality Assurance".
    - a. AISC Quality Certification Program: Submit documentation with initial shop drawing submittal as follows:
      - 1) Copy of AISC Certification Certificate.
- 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. Direct-tension indicators.
  - 3. Tension-control, high-strength, bolt-nut-washer assemblies.
  - 4. Shear stud connectors.
  - 5. Shop primers.
  - 6. Nonshrink grout.
- F. Source quality-control reports.
- G. Field quality-control and special inspection 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,  
-OR-  
Special Inspection shall be conducted on the premises of the steel fabricator in accordance with

1704.3 of the IBC 20006

-OR-

The fabricator is an "Approved Fabricator" in accordance with section 1704.2.2 of the IBC 20006.

- B. Installer Qualifications: A qualified installer who participates in the AISC Quality Certification Program and is designated an AISC-Certified Erector, Category ACSE.
- 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/D1.8M. 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."

## 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.

## PART 2 - PRODUCTS

### 2.1 STRUCTURAL-STEEL MATERIALS

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
- B. W-Shapes: ASTM A 992/A 992M, Grade 50 (345).
- C. Channels, Angles ASTM A 36/A 36M.
- D. Plate and Bar: ASTM A 36/A 36M.

- E. Cold-Formed Hollow Structural Sections: ASTM A 500/A 500M, Grade B, structural tubing.
- F. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.
  - 1. Weight Class: As indicated
  - 2. Finish: Black except where indicated to be galvanized.
- G. Welding Electrodes: Comply with AWS requirements.

## 2.2 BOLTS, CONNECTORS, AND ANCHORS

- A. High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), ASTM A 563, Grade C, heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
- B. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, **heavy-hex** head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
  - 1. Finish: **Plain**.
- C. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.
- D. Headed Anchor Rods: ASTM F 1554, Grade 36, straight.
  - 1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
  - 2. Plate Washers: ASTM A 36/A 36M carbon steel.
  - 3. Finish: Plain.
- E. Threaded Rods: ASTM A 36/A 36M.
  - 1. Nuts: ASTM A 563 (ASTM A 563M) heavy-hex carbon steel.
  - 2. Washers: ASTM F 436 (ASTM F 436M),.
  - 3. Finish: Plain.
- F. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.
- G. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

## 2.3 PRIMER

- A. Shop Primers: Provide product compatible with system as required per Sections 09 9113 “Exterior Painting,” 09 9123 “Interior Painting,” or 09 9601 “High-Performance Coatings” as appropriate for location and painting system indicated.
- B. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20...

## 2.4 GROUT

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

## 2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," and to AISC 360.
  - 1. Camber structural-steel members where indicated.
  - 2. Fabricate beams with rolling camber up.
  - 3. Identify high-strength structural steel according to ASTM A 6/A 6M and maintain markings until structural steel has been erected.
  - 4. Mark and match-mark materials for field assembly.
  - 5. Complete structural-steel assemblies, including welding of units, before starting shop-priming operations.
- B. Thermal Cutting: Perform thermal cutting by machine to greatest extent possible.
  - 1. Plane thermally cut edges to be welded to comply with requirements in AWS D1.1/D1.1M.
- C. Bolt Holes: Cut, drill, or punch standard bolt holes perpendicular to metal surfaces.
- D. Finishing: Accurately finish ends of columns and other members transmitting bearing loads.
- E. Cleaning: Clean and prepare steel surfaces that are to remain unpainted according SSPC-SP 3, "Power Tool Cleaning."
- F. 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.
- G. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel 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.

## 2.6 SHOP CONNECTIONS

- A. High-Strength Bolts: Shop install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
  - 1. Joint Type: Snug tightened unless indicated otherwise on drawings.
- 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. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303 for mill material.
  - 2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.

3. Verify that weld sizes, fabrication sequence, and equipment used for exposed structural steel will limit distortions to allowable tolerances. Prevent weld show-through on exposed steel surfaces.
  - a. Grind butt welds flush.
  - b. Grind or fill exposed fillet welds to smooth profile. Dress exposed welds.

## 2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
  1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
  2. Surfaces to be field welded.
  3. Galvanized surfaces.
- B. Preparation for Shop Priming: Clean surfaces to be painted per primer manufacturer's written instructions. Remove loose rust and mill scale and other spatter, slag, flux deposits, and any other potential bond-breaking materials.
- 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.

## 2.8 GALVANIZING

- A. Hot-Dip Galvanized Finish: Apply zinc coating by the hot-dip process to structural steel according to ASTM A 123/A 123M.
  1. Fill vent and drain holes that are exposed in the finished Work unless they function as weep holes, by plugging with zinc solder and filing off smooth.
  2. Galvanize lintels attached to structural-steel frame and located in exterior walls.

## 2.9 SOURCE QUALITY CONTROL

- A. Testing Agency Engage a qualified testing agency to perform shop tests and inspections.
  1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Bolted Connections: Inspect shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A325 or A490 Bolts."
- C. Welded Connections: Visually inspect shop-welded connections 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 are not accepted.
  3. Ultrasonic Inspection: ASTM E 164.
  4. Radiographic Inspection: ASTM E 94.

- D. Prepare test and inspection reports.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Verify, with certified steel erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.
  - 1. Prepare a certified survey of existing conditions. Include 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. Baseplates Bearing Plates and Leveling Plates: Clean concrete- and masonry-bearing surfaces of bond-reducing materials, and roughen surfaces prior to setting plates. Clean bottom surface of plates.
  - 1. Set plates for structural members on wedges, shims, or setting nuts as required.
  - 2. 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 303, "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 are 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. Remove backing bars or runoff tabs where indicated, back gouge, and grind steel smooth.
  3. Assemble and weld built-up sections by methods that maintain true alignment of axes without exceeding tolerances in AISC 303, "Code of Standard Practice for Steel Buildings and Bridges," for mill material.

### 3.5 FIELD QUALITY CONTROL

- A. Special Inspections: Engage a qualified special inspector to perform the following special inspections:
  1. Verify structural-steel materials and inspect steel frame joint details.
  2. Verify weld materials and inspect welds.
  3. Verify connection materials and inspect high-strength bolted connections.
- B. Testing Agency: Engage a qualified testing agency to perform tests and inspections.
- C. Bolted Connections: Inspect bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
  1. In addition to visual inspection, test and inspect field welds 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 are not accepted.
- c. Ultrasonic Inspection: ASTM E 164.
- d. Radiographic Inspection: ASTM E 94.

### 3.6 REPAIRS AND PROTECTION

- A. Galvanized Surfaces: Clean areas where galvanizing is damaged or missing and repair galvanizing to comply with ASTM A 780/A 780M.
- B. Touchup Painting: Immediately after erection, clean exposed areas where primer is damaged or missing and paint with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
  - 1. Clean and prepare surfaces by SSPC-SP 2 hand-tool cleaning or SSPC-SP 3 power-tool cleaning.

END OF SECTION



## SECTION 05 3100 - STEEL DECKING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Roof deck.
  - 2. Composite floor deck.
- B. Related Requirements:
  - 1. Division 03 Section "Cast-in-Place Concrete" for normal-weight structural concrete fill over steel deck.
  - 2. Division 05 Section "Structural Steel Framing" for shop- and field-welded shear connectors.
  - 3. Division 05 Section "Metal Fabrications" for framing deck openings with miscellaneous steel shapes.
  - 4. Division 09 painting Sections for repair painting of primed deck and finish painting of deck.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings:
  - 1. Include layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, UL and FM ratings, and attachments to other construction.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Certificates: For each type of steel deck.
- C. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that each of the following complies with requirements:
  - 1. UL and FM ratings.
- D. Evaluation Reports: For steel deck.
- E. Field quality-control reports.

1.5 QUALITY ASSURANCE

- A. Testing Agency Qualifications: Qualified according to ASTM E 329 for testing indicated.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. 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.
  - 1. Protect and ventilate acoustical cellular roof deck with factory-installed insulation to maintain insulation free of moisture.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

- A. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- B. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
- C. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 60 percent.

2.2 ROOF DECK

- 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. ASC Profiles, Inc.; a Blue Scope Steel company.
  - 2. Canam United States; Canam Group Inc.
  - 3. CMC Joist & Deck.
  - 4. Consolidated Systems, Inc.; Metal Dek Group.
  - 5. Epic Metals Corporation.
  - 6. Marlyn Steel Decks, Inc.
  - 7. New Millennium Building Systems, LLC.
  - 8. Nucor Corp.; Vulcraft Group.

9. Verco Manufacturing Co.
  10. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.
- B. 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 and Shop-Primed Steel Sheet (where indicated on drawings): ASTM A 653/A 653M, Structural Steel (SS), Grade 33 (230), G90 (Z275) zinc coating; cleaned, pretreated, and primed with manufacturer's standard baked-on, rust-inhibitive primer.
    - a. Color: Manufacturer's standard.
    - b. Elongation in 2" or 50mm: 20 percent minimum.
  2. Deck Profile: Type WR, wide rib.
  3. Profile Depth: 1-1/2 inches (38 mm).
  4. Design Uncoated-Steel Thickness: 0.0358 inch (0.91 mm).
  5. Span Condition: Triple span or more.
  6. Side Laps: As indicated on drawings.

### 2.3 COMPOSITE FLOOR DECK

- 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. ASC Profiles, Inc.; a Blue Scope Steel company.
  2. Canam United States; Canam Group Inc.
  3. CMC Joist & Deck.
  4. Consolidated Systems, Inc.; Metal Dek Group.
  5. Epic Metals Corporation.
  6. Marlyn Steel Decks, Inc.
  7. New Millennium Building Systems, LLC.
  8. Nucor Corp.; Vulcraft Group.
  9. Verco Manufacturing Co.
  10. Wheeling Corrugating Company; Div. of Wheeling-Pittsburgh Steel Corporation.
- B. 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), G60 (Z275) zinc coating.
    - a. Elongation in 2" or 50mm: 20 percent minimum.
  2. Profile Depth: 3 inches (76.2 mm).
  3. Design Uncoated-Steel Thickness: 0.0358 inch (0.91 mm).
  4. Span Condition: Triple span or more.
  5. Side Laps: As indicated on drawings.

### 2.4 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.

- B. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- C. 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.
- D. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi (230 MPa), of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 31 for overhang and slab depth.
- E. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck unless otherwise indicated.
- F. Flat Sump Plates: Single-piece steel sheet, 0.0747 inch (1.90 mm) thick, of same material and finish as deck, with 3-inch wide flanges and sloped recessed pans of 1-1/2 inch minimum depth. For drains, cut holes in the field. For drains, cut holes in the field.
- G. Galvanizing Repair Paint: ASTM A 780.
- H. Repair Paint: Manufacturer's standard rust-inhibitive primer of same color as primer.

### 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.
- 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.

### 3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches (38 mm) long, and as follows:
  - 1. Weld Diameter: 5/8 inch (16 mm), nominal.
  - 2. Weld Spacing: Weld edge and interior ribs of deck units with a minimum of two welds per deck unit at each support. Space welds as indicated on drawings.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 18 inches (457 mm) and as follows:
  - 1. Mechanically clinch as indicated on drawings. (button punch not allowed)  
-OR-
  - 2. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds as indicated on drawings.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
  - 1. End Joints: Lapped 2 inches (51 mm) minimum.
- 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 fastener at each corner.
- E. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.
  - 1. Weld cover plates at changes in direction of roof-deck panels unless otherwise indicated.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

### 3.4 FLOOR-DECK INSTALLATION

- A. Fasten floor-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated and as follows:
  - 1. Weld Diameter: 5/8 inch (16 mm), nominal.
  - 2. Weld Spacing: Space and locate welds as indicated per drawings.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of half of the span or 36 inches (914 mm), and as follows:
  - 1. Mechanically clinch, as indicated on drawings..
  - 2. Fasten with a minimum of 1-1/2-inch- (38-mm-) long welds as indicated on drawings.

- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm), with end joints as follows:
  - 1. End Joints: Lapped or butted at Contractor's option.
- D. Pour Stops and Girder Fillers: Weld steel sheet pour stops and girder fillers to supporting structure according to SDI recommendations unless otherwise indicated.
- E. Floor-Deck Closures: Weld steel sheet column closures, cell closures, and Z-closures to deck, according to SDI recommendations, to provide tight-fitting closures at open ends of ribs and sides of deck.
- F. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: 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.

### 3.6 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. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
  - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
- C. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION

## SECTION 05 4000 - COLD-FORMED METAL FRAMING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Exterior non-load-bearing wall and parapet framing.
  - 2. Exterior soffit framing.
- B. Related Sections include the following:
  - 1. Division 09 Section "Non-Structural Metal Framing" for interior non-load-bearing, metal-stud framing and ceiling-suspension assemblies.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Provide cold-formed metal framing capable of withstanding design loads within limits and under conditions indicated.
  - 1. Design Loads: As indicated and as follows:
    - a. Dead Loads: Weights of materials and construction
    - b. Wind Loads: As indicated on General Structural Notes Sheet S0.1.
    - c. Seismic Loads: As indicated on General Structural Notes Sheet S0.1.
  - 2. Deflection Limits: Design framing systems to withstand design loads without deflections greater than the following:
    - a. Exterior Non-Load-Bearing Framing: Horizontal deflection of 1/240 of the wall height.
    - b. Exterior Soffit Framing: Vertical deflection of 1/240 of the span.
  - 3. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change of 120 deg F (67 deg C).
  - 4. Design framing system to maintain clearances at openings, to allow for construction tolerances, and to accommodate live load deflection of primary building structure as follows:
    - a. Upward and downward movement of 1/2 inch (13 mm).
- B. Cold-Formed Steel Framing, General: Design according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions."
  - 1. Headers: Design according to AISI's "Standard for Cold-Formed Steel Framing - Header Design."
  - 2. Design exterior non-load-bearing wall framing to accommodate horizontal deflection without regard for contribution of sheathing materials.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of cold-formed metal framing product and accessory indicated.
- B. Shop Drawings: Show layout, spacings, sizes, thicknesses, and types of cold-formed metal framing; fabrication; and fastening and anchorage details, including mechanical fasteners. Show reinforcing channels, opening framing, supplemental framing, strapping, bracing, bridging, splices, accessories, connection details, and attachment to adjoining work.
  - 1. For cold-formed metal framing indicated to comply with design loads, include structural analysis data signed and sealed by the qualified professional engineer responsible for their preparation.
- C. Welding certificates.
- D. Qualification Data: For professional engineer and testing agency.
- E. Product Test Reports: From a qualified testing agency, unless otherwise stated, indicating that each of the following complies with requirements, based on evaluation of comprehensive tests for current products:
  - 1. Steel sheet.
  - 2. Expansion anchors.
  - 3. Power-actuated anchors.
  - 4. Mechanical fasteners.
  - 5. Vertical deflection clips.
  - 6. Miscellaneous structural clips and accessories.
- F. Research/Evaluation Reports: For cold-formed metal framing.

#### 1.5 QUALITY ASSURANCE

- A. Engineering Responsibility: Preparation of Shop Drawings, design calculations, and other structural data by a qualified professional engineer.
- B. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in 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 cold-formed metal framing that are similar to those indicated for this Project in material, design, and extent.
- C. Testing Agency Qualifications: An independent testing agency, acceptable to authorities having jurisdiction, qualified according to ASTM E 329 to conduct the testing indicated.
- D. Product Tests: Mill certificates or data from a qualified independent testing agency indicating steel sheet complies with requirements, including base-metal thickness, yield strength, tensile strength, total elongation, chemical requirements, ductility, and metallic-coating thickness.
- E. Welding: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code--Steel," and AWS D1.3, "Structural Welding Code--Sheet Steel."

- F. Fire-Test-Response Characteristics: Where indicated, provide cold-formed metal framing identical to that of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
- G. AISI Specifications and Standards: Comply with AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members" and its "Standard for Cold-Formed Steel Framing - General Provisions."
  - 1. Comply with AISI's "Standard for Cold-Formed Steel Framing - Header Design."
- H. Preinstallation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination."

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect cold-formed metal framing from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Store cold-formed metal framing, protect with a waterproof covering, and ventilate to avoid condensation.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering cold-formed metal framing that may be incorporated into the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide cold-formed metal framing by one of the following:
  - 1. Allied Studco.
  - 2. AllSteel Products, Inc.
  - 3. California Expanded Metal Products Company.
  - 4. Clark Steel Framing.
  - 5. Consolidated Fabricators Corp.; Building Products Division.
  - 6. Craco Metals Manufacturing, LLC.
  - 7. Custom Stud, Inc.
  - 8. Dale/Incor.
  - 9. Design Shapes in Steel.
  - 10. Dietrich Metal Framing; a Worthington Industries Company.
  - 11. Formetal Co. Inc. (The).
  - 12. Innovative Steel Systems.
  - 13. MarinoWare; a division of Ware Industries.
  - 14. Quail Run Building Materials, Inc.
  - 15. SCAFCO Corporation.
  - 16. Southeastern Stud & Components, Inc.
  - 17. Steel Construction Systems.
  - 18. Steeler, Inc.
  - 19. Super Stud Building Products, Inc.

20. United Metal Products, Inc.

## 2.2 MATERIALS

- A. Recycled Content of Steel Products: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half of preconsumer recycled content is not less than 60 percent.
- B. Steel Sheet: ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of grade and coating weight as follows:
  - 1. Grade: As required by structural performance .
  - 2. Coating: G60 (Z180 >).
- C. Steel Sheet for Vertical Deflection Clips: ASTM A 653/A 653M, structural steel, zinc coated, of grade and coating as follows:
  - 1. Grade: As required by structural performance.
  - 2. Coating: G90 (Z275).

## 2.3 EXTERIOR NON-LOAD-BEARING WALL FRAMING

- A. Steel Studs: Manufacturer's standard C-shaped steel studs, of web depths indicated, punched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm).
  - 2. Flange widths vary with application. If sheathing or masonry ties are required, consider minimum flange width of 1-5/8 inches (41 mm). Sequence corresponds to new common flange width designators 137, 162, 200, and 250.
- B. Steel Track: Manufacturer's standard U-shaped steel track, of web depths indicated, unpunched, with unstiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0329 inch (0.84 mm) Matching steel studs.
  - 2. Flange Width: 1-1/2 inches (32 mm).
- C. Vertical Deflection Clips: Manufacturer's standard bypass and head clips, capable of accommodating upward and downward vertical displacement of primary structure through positive mechanical attachment to stud web.
  - 1. 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:
    - a. Dietrich Metal Framing; a Worthington Industries Company.
    - b. The Steel Network, Inc.
    - c. Simpson Strong-Tie
- D. Single Deflection Track: Manufacturer's single, deep-leg, U-shaped steel track; unpunched, with unstiffened flanges, of web depth to contain studs while allowing free vertical movement, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm) Flange Width: 1 inch (25 mm) plus the design gap for 1-story structures and 1 inch (25 mm) plus twice the design gap for other applications.

- E. Double Deflection Tracks: Manufacturer's double, deep-leg, U-shaped steel tracks, consisting of nested inner and outer tracks; unpunched, with unstiffened flanges.
  - 1. Outer Track: Of web depth to allow free vertical movement of inner track, with flanges designed to support horizontal and lateral loads and transfer them to the primary structure, and as follows:
    - a. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm) Flange Width: 1 inch (25 mm) plus the design gap for 1-story structures and 1 inch (25 mm) plus twice the design gap for other applications.
  - 2. Inner Track: Of web depth indicated, and as follows:
    - a. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm)
    - b. Flange Width: <Insert dimension equal to sum of outer deflection track flange width plus 1 inch (25 mm).>

#### 2.4 EXTERIOR SOFFIT FRAMING

- A. Steel Soffit Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, and as follows:
  - 1. Minimum Base-Metal Thickness: 0.0428 inch (1.09 mm).
  - 2. Flange widths vary with application. If sheathing, consider minimum flange width of 1-5/8 inches (41 mm). Sequence corresponds to new common flange width designators 137, 162, 200, and 250.

#### 2.5 FRAMING ACCESSORIES

- A. Fabricate steel-framing accessories from steel sheet, ASTM A 1003/A 1003M, Structural Grade, Type H, metallic coated, of same grade and coating weight used for framing members.
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
  - 1. Supplementary framing.
  - 2. Bracing, bridging, and solid blocking.
  - 3. Web stiffeners.
  - 4. Anchor clips.
  - 5. End clips.
  - 6. Foundation clips.
  - 7. Gusset plates.
  - 8. Stud kickers, knee braces, and girts.
  - 9. Joist hangers and end closures.
  - 10. Hole reinforcing plates.
  - 11. Backer plates.

#### 2.6 ANCHORS, CLIPS, AND FASTENERS

- A. Steel Shapes and Clips: ASTM A 36/A 36M, zinc coated by hot-dip process according to ASTM A 123/A 123M.
- B. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times design load, as determined by testing per ASTM E 488 conducted by a qualified independent testing agency.

- C. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times design load, as determined by testing per ASTM E 1190 conducted by a qualified independent testing agency.
- 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.

## 2.7 MISCELLANEOUS MATERIALS

- A. Galvanizing Repair Paint: ASTM A 780.
- B. Shims: Load bearing, high-density multimonomer plastic, nonleaching.
- C. Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to match width of bottom track or rim track members.

## 2.8 FABRICATION

- A. Fabricate cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened, according to referenced AISI's specifications and standards, manufacturer's written instructions, and requirements in this Section.
  - 1. Fabricate framing assemblies using jigs or templates.
  - 2. Cut framing members by sawing or shearing; do not torch cut.
  - 3. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting as standard with fabricator. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, with screw penetrating joined members by not less than three exposed screw threads.
  - 4. Fasten other materials to cold-formed metal framing by welding, bolting, or screw fastening, according to Shop Drawings.
- B. Reinforce, stiffen, and brace framing assemblies to withstand handling, delivery, and erection stresses. Lift fabricated assemblies to prevent damage or permanent distortion.
- C. Fabrication Tolerances: Fabricate assemblies level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (1:960) and as follows:
  - 1. Spacing: 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.
  - 2. Squareness: Fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch (3 mm).

### 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 sealer gaskets to isolate the underside of wall bottom track or rim track and the top of foundation wall or slab at stud or joist locations.

#### 3.3 INSTALLATION, GENERAL

- A. Cold-formed metal framing may be shop or field fabricated for installation, or it may be field assembled.
- B. Install cold-formed metal framing according to AISI's "Standard for Cold-Formed Steel Framing - General Provisions" and to manufacturer's written instructions unless more stringent requirements are indicated.
- C. Install shop- or field-fabricated, cold-formed framing and securely anchor to supporting structure.
  - 1. Screw, bolt, or weld wall panels at horizontal and vertical junctures to produce flush, even, true-to-line joints with maximum variation in plane and true position between fabricated panels not exceeding 1/16 inch (1.6 mm).
- D. Install cold-formed metal framing and accessories plumb, square, and true to line, and with connections securely fastened.
  - 1. Cut framing members by sawing or shearing; do not torch cut.
  - 2. Fasten cold-formed metal framing members by welding, screw fastening, clinch fastening, or riveting. Wire tying of framing members is not permitted.
    - a. Comply with AWS D1.3 requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
    - b. Locate mechanical fasteners and install according to Shop Drawings, and complying with requirements for spacing, edge distances, and screw penetration.
- E. Install framing members in one-piece lengths unless splice connections are indicated for track or tension members.

- F. Install temporary bracing and supports to secure framing and support loads comparable in intensity to those for which structure was designed. Maintain braces and supports in place, undisturbed, until entire integrated supporting structure has been completed and permanent connections to framing are secured.
- G. Do not bridge building expansion and control joints with cold-formed metal framing. Independently frame both sides of joints.
- H. Install insulation, specified in Division 07 Section "Thermal Insulation," in built-up exterior framing members, such as headers, sills, boxed joists, and multiple studs at openings, that are inaccessible on completion of framing work.
- I. Fasten hole reinforcing plate over web penetrations that exceed size of manufacturer's standard punched openings.
- J. Erection Tolerances: Install cold-formed metal framing level, plumb, and true to line to a maximum allowable tolerance variation of 1/8 inch in 10 feet (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 EXTERIOR NON-LOAD-BEARING AND PARAPET WALL INSTALLATION

- A. Install continuous tracks sized to match studs. Align tracks accurately and securely anchor to supporting structure as indicated.
- B. Fasten both flanges of studs to top and bottom track, unless otherwise indicated. Space studs as follows:
  - 1. Stud Spacing: 16 inches (406 mm)
- C. Set studs plumb, except as needed for diagonal bracing or required for nonplumb walls or warped surfaces and similar requirements.
- D. Isolate non-load-bearing steel framing from building structure to prevent transfer of vertical loads while providing lateral support.
  - 1. Install single-leg deflection tracks and anchor to building structure.
  - 2. Install double deep-leg deflection tracks and anchor outer track to building structure.
  - 3. Connect vertical deflection clips to bypassing studs and anchor to building structure.
- E. Install horizontal bridging in wall studs, spaced in rows indicated on Drawings but not more than 60 inches (1220 mm) apart. Fasten at each stud intersection.
  - 1. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and stud-track solid blocking of width and thickness to match studs. Fasten flat straps to stud flanges and secure solid blocking to stud webs or flanges.
  - 2. Bridging: Proprietary bridging bars installed according to manufacturer's written instructions.
- F. Install miscellaneous framing and connections, including stud kickers, web stiffeners, clip angles, continuous angles, anchors, fasteners, and stud girts, to provide a complete and stable wall-framing system.

### 3.5 EXTERIOR SOFFIT JOIST INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
- B. Install joists bearing on or suspended from supporting frame, level, straight, and plumb; adjust to final position, brace, and reinforce. Fasten joists to both flanges of joist track.
  - 1. Install joists over supporting frame with a minimum end bearing of 1-1/2 inches (38 mm).
  - 2. Reinforce ends and bearing points of joists with web stiffeners, end clips, joist hangers, steel clip angles, or steel-stud sections as indicated on Shop Drawings.
- C. Space joists not more than 2 inches (51 mm) from abutting walls, and as follows:
  - 1. Joist Spacing: 16 inches (406 mm).
- D. Frame openings with built-up joist headers consisting of joist and joist track, nesting joists, or another combination of connected joists if indicated.
- E. Install joist reinforcement at interior supports with single, short length of joist section located directly over interior support, with lapped joists of equal length to joist reinforcement, or as indicated on Shop Drawings.
- F. Install bridging at intervals indicated on Shop Drawings. Fasten bridging at each joist intersection as follows:
  - 1. Bridging: Joist-track solid blocking of width and thickness indicated, secured to joist webs.
  - 2. Bridging: Combination of flat, taut, steel sheet straps of width and thickness indicated and joist-track solid blocking of width and thickness indicated. Fasten flat straps to bottom flange of joists and secure solid blocking to joist webs.
- G. Secure joists to adjacent structure.
- H. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

### 3.6 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.

3.7 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing with galvanized repair paint according to ASTM A 780 and manufacturer's written instructions.
- B. Provide final protection and maintain conditions, in a manner acceptable to manufacturer and Installer, that ensure that cold-formed metal framing is without damage or deterioration at time of Substantial Completion.

END OF SECTION

## SECTION 05 5000 - METAL FABRICATIONS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Ships ladders.
  - 2. Loose bearing and leveling plates.
  - 3. Steel framing and support for overhead coiling doors.
  - 4. Steel framing and support for coiling counter doors and grilles.
  - 5. Steel framing and supports for mechanical and electrical equipment.
  - 6. Steel framing and supports for applications where framing and supports are not specified in other Sections.
  - 7. Miscellaneous metal trim.
  - 8. Slotted channel framing.
  - 9. Pipe bollards.
  - 10. Wall braces.
  - 11. Millwork supports, brackets and frames.
  - 12. Elevator pit sump covers.
  - 13. Metal floor plate.
  - 14. Anchor bolts not specified in other Sections.
  - 15. Exterior sun control devices not attached to curtain wall system.
- B. Related Sections:
  - 1. Section 05 5100 "Metal Stairs" for engineered metal stairs.
  - 2. Section 08 4413 "Glazed Aluminum Curtain Walls" for sun control devices attached to curtain wall system.

#### 1.3 DEFINITIONS

- A. Definitions in ASTM E 985 for railing-related terms apply to this Section.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For the following:
  - 1. Prefabricated items.
    - a. Include installation instructions for prefabricated items.
  - 2. Paint products.
  - 3. Grout.

- B. Shop Drawings: Detail fabrication and erection of each metal fabrication indicated. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
  - 1. Provide templates for anchors and bolts specified for installation under other Sections.
- C. Samples representative of materials and finished products as may be requested by Architect.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Welding Certificates: Copies of certificates for welding procedures and personnel.
- B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.

#### 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: A firm experienced in producing metal fabrications similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.
- B. Welding: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1, "Structural Welding Code--Steel."
  - 2. AWS D1.2, "Structural Welding Code--Aluminum."
  - 3. AWS D1.3, "Structural Welding Code--Sheet Steel."
  - 4. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if pertinent, has undergone recertification.

#### 1.7 PROJECT CONDITIONS

- A. Field Measurements: Where metal fabrications are indicated to fit walls and other construction, verify dimensions by field measurements before fabrication and indicate measurements on Shop Drawings. Coordinate fabrication schedule with construction progress to avoid delaying the Work.
  - 1. Established Dimensions: Where field measurements cannot be made without delaying the Work, establish dimensions and proceed with fabricating metal fabrications without field measurements. Coordinate construction to ensure that actual dimensions correspond to established dimensions. Allow for trimming and fitting.

#### 1.8 COORDINATION

- A. Coordinate installation of anchorages for metal fabrications. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.
- B. Coordinate installation of wall handrails as follows:
  - 1. Mount handrails only on completed walls. Do not support handrails temporarily by any means not satisfying structural performance requirements.

## PART 2 - PRODUCTS

### 2.1 METALS, GENERAL

- A. Metal Surfaces, General: For metal fabrications 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.

### 2.2 FERROUS METALS

- A. Steel Plates, Shapes, and Bars: ASTM A 36.
- B. Stainless-Steel Sheet, Strip, Plate, and Flat Bars: ASTM A 666, Type 304.
- C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- D. Stainless-Steel Tubing: ASTM A 269, Type 304.
- E. Steel Tubing: Cold-formed steel tubing complying with ASTM A 500.
- F. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless another weight is indicated or required by structural loads.
  - 1. Black finish, unless otherwise indicated.
- G. Slotted Channel Framing: Cold-formed metal channels with flange edges returned toward web and with 9/16-inch-wide slotted holes in webs at 2 inches o.c.
  - 1. Sizes of Channels: Refer to Drawings.
  - 2. Metal and Thickness: Uncoated steel complying with ASTM A 1008, Grade 33; 0.0966-inch minimum thickness.
  - 3. Finish: Rust-inhibitive, baked-on, acrylic enamel.
  - 4. Fittings: As required.
- H. Cast-in-Place Anchors in Concrete: Anchors of type indicated below, fabricated from corrosion-resistant materials capable of sustaining, without failure, the load imposed within a safety factor of 4, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
  - 1. Threaded or wedge type; galvanized ferrous castings, either ASTM A 47 malleable iron or ASTM A 27 cast steel. Provide bolts, washers, and shims as needed, hot-dip galvanized per ASTM A 153.
- I. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

### 2.3 PAINT

- A. Shop Primers: Provide primers that comply with Division 09 Section "Painting" or "High-Performance Coatings," as applicable.
  - 1. Available Products: Primer used shall be compatible with manufacturer selected for Work of this Project specified in Division 09.

- B. Galvanizing Repair Paint: High-zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- C. Bituminous Paint: Cold-applied asphalt mastic complying with SSPC-Paint 12, except containing no asbestos fibers, or cold-applied asphalt emulsion complying with ASTM D 1187.

#### 2.4 FASTENERS

- A. General: Provide Type 304 or 316 stainless-steel fasteners for exterior use and zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 5, where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A; with hex nuts, ASTM A 563; and, where indicated, flat washers.
- C. Anchor Bolts: ASTM F 1554, Grade 36.
- D. Machine Screws: ASME B18.6.3.
- E. Lag Bolts: ASME B18.2.1.
- F. Wood Screws: Flat head, carbon steel, ASME B18.6.1.
- G. Plain Washers: Round, carbon steel, ASME B18.22.1.
- H. Lock Washers: Helical, spring type, carbon steel, ASME B18.21.1.
- I. Expansion Anchors: Anchor bolt and sleeve assembly of material indicated below with capability to sustain, without failure, a load equal to six times the load imposed when installed in unit masonry and equal to four times the load imposed when installed in concrete, as determined by testing per ASTM E 488, conducted by a qualified independent testing agency.
  - 1. Material (Interior Use): Carbon-steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.
  - 2. Material (Other): Alloy Group 1 or 2 stainless-steel bolts complying with ASTM F 593 and nuts complying with ASTM F 594.
- J. Toggle Bolts: FS FF-B-588, tumble-wing type, class and style as needed.

#### 2.5 GROUT

- A. 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.

#### 2.6 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Use connections that maintain structural value of joined pieces. Clearly mark units for reassembly and coordinated installation.

- B. Shear and punch metals cleanly and accurately. Remove burrs.
- C. Ease exposed edges to a radius of approximately 1/32 inch, unless otherwise indicated. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.
- D. 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.
- E. Provide for anchorage of type indicated; coordinate with supporting structure. Fabricate and space anchoring devices to secure metal fabrications rigidly in place and to support indicated loads.
- F. Cut, reinforce, drill, and tap metal fabrications as indicated to receive finish hardware, screws, and similar items.
- G. Fabricate joints that will be exposed to weather in a manner to exclude water, or provide weep holes where water may accumulate.
- H. Allow for thermal movement of exterior metal work resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening up of joints, overstressing of components, 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 (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- I. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges.
- J. Remove sharp or rough areas on exposed traffic surfaces.
- K. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Use exposed fasteners of type indicated or, if not indicated, Phillips flat-head (countersunk) screws or bolts. Locate joints where least conspicuous.

## 2.7 METAL SHIPS' LADDERS

- A. Provide metal ships' ladders where indicated. Fabricate of open-type construction with channel or plate stringers and pipe and tube railings unless otherwise indicated. Provide brackets and fittings for installation.
  - 1. Treads shall be not less than 5 inches exclusive of nosing or less than 8-1/2 inches including the nosing, and riser height shall be not more than 9-1/2 inches.
  - 2. Fabricate ships' ladders, including railings from steel.

3. Fabricate treads and platforms from welded or pressure-locked steel bar grating. Limit openings in gratings to no more than 1/2 inch in least dimension.
4. Comply with applicable railing requirements in Section 05 5100 "Metal Stairs."

B. Galvanize and prime steel ships' ladders, including treads, railings, brackets, and fasteners.

## 2.8 LOOSE BEARING AND LEVELING PLATES

A. Provide loose bearing and leveling plates for steel items bearing on masonry or concrete construction. Drill plates to receive anchor bolts and for grouting.

B. Galvanize plates after fabrication.

## 2.9 MISCELLANEOUS FRAMING AND SUPPORTS

A. General: Provide steel framing and supports that are not a part of structural-steel framework as necessary to complete the Work.

B. Fabricate units from structural-steel shapes, plates, and bars of welded construction, unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction retained by framing and supports. Cut, drill, and tap units to receive hardware, hangers, and similar items.

1. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors 1-1/4 inches wide by 1/4 inch thick by 8 inches long at 24 inches o.c., unless otherwise indicated.
2. Furnish inserts if units must be installed after concrete is placed.

C. Galvanize miscellaneous framing and supports where indicated.

## 2.10 MISCELLANEOUS STEEL TRIM

A. Unless otherwise indicated, fabricate units from structural-steel shapes, plates, and bars of profiles shown with continuously welded joints, and smooth exposed edges. Miter corners and use concealed field splices where possible.

B. Provide cutouts, fittings, and anchorages as needed to coordinate assembly and installation with other work. Provide anchors, welded to trim, for embedding in concrete or masonry construction, spaced not more than 6 inches from each end, 6 inches from corners, and 24 inches o.c., unless otherwise indicated.

C. Galvanize miscellaneous steel trim in the following locations:

1. Exterior.
2. Interior, where indicated.

## 2.11 METAL FLOOR PLATE

A. Fabricate from rolled-steel floor plate of thickness as shown in Drawings or, if not shown in Drawings as indicated below:

1. Thickness: 1/4 inch.

2.12 ELEVATOR PIT SUMP COVERS

- A. Fabricate as indicated on structural Drawings.

2.13 PIPE BOLLARDS

- A. Fabricate pipe bollards from Schedule 40 steel pipe, unless shown otherwise.

2.14 EXTERIOR SUN CONTROL DEVICES

- A. Fabricate sun control devices for punched openings using the following:
1. Horizontal Louver:
    - a. Perimeter Frame: Galvanized steel MC channel with mitered, full profile welded corners with welds ground smooth to match adjacent surface, in size as indicated on Drawings.
    - b. Infill Metal Grating: Fabricate from flat stock galvanized steel with the following characteristics:
      - 1) Bearing Bar Spacing: 7/16 inch.
      - 2) Cross Bar Spacing: 2 inches.
      - 3) Bar Size: 1- by 3/16-inch.
      - 4) Fabrication: Swag lock.
  2. Vertical Louver:
    - a. Perimeter Frame: Galvanized steel angle with mitered, full profile welded corners with welds ground smooth to match adjacent surface, in size as indicated on Drawings.
    - b. Infill Metal Panel: Fabricate from galvanized steel sheet, 18 gauge, with 9/64 inch perforations at 3/16 inch staggered centers.
  3. Finish: Factory finish with system as specified in Section 09 9600 "High-Performance Coatings."

2.15 FINISHES, GENERAL

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Finish metal fabrications after assembly.

2.16 STEEL AND IRON FINISHES

- A. Galvanizing: Hot-dip galvanize items as indicated to comply with applicable standard listed below:
1. ASTM A 123, for galvanizing steel and iron products.
  2. ASTM A 153, for galvanizing steel and iron hardware.
- B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface-preparation specifications and environmental exposure conditions of installed metal fabrications:
1. Exteriors (SSPC Zone 1B): SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  2. Interiors (SSPC Zone 1A): SSPC-SP 3, "Power Tool Cleaning."

- C. Apply shop primer to uncoated surfaces of metal fabrications, 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," for shop painting.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

#### 2.17 STAINLESS-STEEL FINISHES

- A. Remove tool and die marks and stretch lines or blend into finish.
- B. Grind and polish surfaces to produce uniform, directionally textured, polished finish indicated, free of cross scratches. Run grain with long dimension of each piece.
- C. Bright, Directional Polish: No. 4 finish.
- D. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION, GENERAL

- A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal fabrications to in-place construction. Include threaded fasteners for concrete and masonry inserts, toggle bolts, through-bolts, lag bolts, wood screws, and other connectors.
- B. 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.
- C. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.
- D. 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.
- E. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.

### 3.2 SETTING BEARING AND LEVELING PLATES

- A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of plates.
- B. Set bearing and leveling plates on leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts.
  - 1. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

### 3.3 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, if any.

### 3.4 INSTALLING PIPE BOLLARDS

- A. Anchor bollards in concrete in formed or core-drilled holes not less than 8 inches deep and 3/4 inch greater than OD of bollard. After bollards have been inserted into holes, fill annular space surrounding bollard solidly with nonshrink, nonmetallic grout, mixed and placed to comply with grout manufacturer's written instructions. Slope grout up approximately 1/8 inch toward bollard.
- B. Fill bollards solidly with concrete, mounding top surface.

### 3.5 INSTALLING SUN CONTROL DEVICES

- A. Install sun control devices as indicated on Drawings and per reviewed Shop Drawings.

### 3.6 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 dry film thickness.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION



## SECTION 05 5100 - METAL STAIRS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Engineered stairs with concrete-filled and abrasive-coating-finished formed-metal treads.
  - 2. Steel tube railings attached to metal stairs.
  - 3. Steel tube handrails attached to walls adjacent to metal stairs.
- B. Related Sections:
  - 1. Division 03 Section "Cast-in-Place Concrete" for concrete fill for stair treads.

#### 1.3 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Design metal stairs, including comprehensive engineering analysis by a qualified professional engineer licensed in state which Project occurs, using performance requirements and design criteria indicated.
- B. Structural Performance of Stairs: Engineer, fabricate, and install steel stairs to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each component of steel stairs.
  - 1. Treads of Steel Stairs: Capable of withstanding a uniform load of 100 lbf per sq. ft. or a concentrated load of 300 lbf on an area of 4 sq. inches located in the center of the tread, whichever produces the greater stress.
  - 2. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above as well as stresses resulting from railing system loads.
  - 3. Limit deflection of treads and framing members to  $L/240$  or 1/8 inch, whichever is less.
- C. Structural Performance of Railings: Engineer, fabricate, and install handrails and railing systems to withstand the following structural loads without exceeding the allowable design working stress of the materials involved, including anchors and connections. Apply each load to produce the maximum stress in each of the respective components of each metal fabrication.
  - 1. Handrails and Top Rails of Guards:
    - a. Uniform load of 50 lbf/ ft. applied at any point in any direction.
    - b. Concentrated load of 200 lbf applied in any direction.
    - c. Uniform and concentrated loads need not be assumed to act concurrently.
  - 2. Intermediate rails:
    - a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft.
    - b. Infill load and other loads need not be assumed to act concurrently.

- D. Seismic Performance: Provide metal stairs capable of withstanding the effects of earthquake motions determined according to ASCE 7, Minimum Design Loads for Buildings and Other Structures: Section 9.
- E. 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:
  - 1. Industrial Type Stairs: Industrial Class.
- F.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For metal stair system. Furnish information on materials, components, fabrication and installation.
- B. Shop Drawings: Detail fabrication and installation of steel stairs, railings and handrails. Include plans, elevations, sections, and details of steel stairs and their connections similar to those indicated for this Project. Show anchorage and accessory items. Provide templates for anchors and bolts specified for installation under other sections.
  - 1. For installed steel stairs indicated to comply with certain design loadings, include structural analysis data sealed and signed by the qualified professional engineer who was responsible for their preparation.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Welding certificates.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for stairs and railings.
  - 1. Test railings according ASTM E 894 and ASTM E 935.

#### 1.6 QUALITY ASSURANCE

- A. Fabricator Qualifications: Firm experienced in producing steel stairs similar to those indicated for this Project with a record of successful in-service performance and with sufficient production capacity to produce required units without delaying the Work.
  - 1. Fabricator shall have minimum of 10 years successful production of product.
- B. Installer Qualifications: Arrange for steel stair specified in this Section to be fabricated and installed by the same firm.
- C. 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 the installation of metal stairs (including handrails and railing systems) similar to this Project in material, design, and extent.
- D. Welding Qualifications: Qualify procedures and personnel according to the following:
  - 1. AWS D1.1, "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 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide preassembled stair units by one of the following:
  - 1. American Metal Works, Inc.
  - 2. American Stair Corp., Inc.
  - 3. The Sharon Companies, Ltd.
  - 4. Alfab, Inc.

### 2.2 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.

### 2.3 FERROUS METALS

- A. Metal Surfaces, General: For surfaces exposed to view in the completed Work, provide materials selected for their surface flatness, smoothness, and freedom from surface blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, roughness, or, for steel sheet, variations in flatness exceeding those permitted by referenced standards for stretcher-leveled sheet.
- B. Steel Plates, Shapes, and Bars: ASTM A 36.
- C. Steel Tubing: Product type (manufacturing method) and as follows:
  - 1. Cold-formed steel tubing: ASTM A 500.
  - 2. Hot-formed steel tubing: ASTM A 501.
- D. Steel Pipe: ASTM A 53, standard weight (Schedule 40), unless weight is otherwise indicated or required by structural loads.
- E. Uncoated Steel Sheet: Commercial quality, product type (method of manufacture) as follows:

1. Hot-Rolled Steel Sheet: ASTM A 569.

## 2.4 FASTENERS

- A. General: Provide zinc-plated fasteners with coating complying with ASTM B 633, Class Fe/Zn 25 for electrodeposited zinc coating, for exterior use or where built into exterior walls. Select fasteners for type, grade, and class required.
- B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.
- C. Lag Bolts: ANSI B18.2.1..
- D. Plain Washers: Round, carbon steel, ANSI B18.22.1.
- E. Lock Washers: Helical, spring type, carbon steel, ANSI B18.21.1.
- F. Expansion Anchors: Anchor bolt and sleeve assemblies of material indicated below with capability to sustain, without failure, a load equal to 6 times the load imposed when installed in unit masonry 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 agency.
  1. Material for Interior Locations: Carbon steel components zinc-plated to comply with ASTM B 633, Class Fe/Zn 5.

## 2.5 PAINT

- A. Shop Primers: Provide primers that comply with Section 09 9600 "High-Performance Coatings."
- B. Galvanized Repair Paint: High-zinc-dust-content paint for re-galvanizing welds in steel, complying with SSPC-Paint 20.
- C. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.6 Miscellaneous Materials

- A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
- B. Non-shrink, Nonmetallic Grout: Factory-packaged, non-staining, noncorrosive, nongaseous grout complying with ASTM C 1107. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- C. Concrete Materials and Properties: Comply with requirements in Division 03 Section "Cast-in-Place Concrete" for normal-weight, air-entrained, ready-mix concrete with a minimum 28-day compressive strength of 3000 psi unless otherwise indicated.

## 2.7 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 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 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 Type 1 welds: no evidence of 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.
- H. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

## 2.8 STEEL-FRAMED STAIRS

- A. Stair Framing: Fabricate stringers of AISC C12 Sections with minimum flange width of 3 inches. Connect stringers to mezzanine as indicated in Structural Drawings.
  - 1. Where masonry walls support steel stairs, provide temporary supporting struts designed for erecting steel stair components before installing masonry.
- B. Metal Tread Risers: Shape metal for risers and treads to conform to configuration shown. Provide thicknesses of structural steel sheet for metal treads and risers indicated, but not less than that required, to support total design loading.
  - 1. Stair Tread: Form metal pans of uncoated hot-rolled steel sheet, unless otherwise indicated.

2. Attach risers and sub-treads to stringers with brackets made of steel angles or bars. Weld brackets to stringers and attach metal pans to brackets by welding, riveting, or bolting.
3. Shape metal pans to include nosing integral with riser.

## 2.9 STAIR RAILINGS

- A. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacing, and anchorage, but not less than that needed to withstand indicated loads.
  1. Rails and Posts: 1-1/2-inch-diameter top and bottom rails and 1-1/2-inch-diameter posts.
  2. Intermediate Rails Infill: 1-1/2-inch-diameter intermediate rails spaced as shown.
- B. 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 Type 1 welds: no evidence of a welded joint.
- C. Form changes in direction of railings as follows:
  1. By radius bends of radius indicated or by inserting prefabricated elbow fittings of radius indicated.
- D. 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.
- E. Close exposed ends of railing members with prefabricated end fittings.
- F. 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 or less.
- G. 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.
  2. For galvanized railings, provide galvanized fittings, brackets, fasteners, sleeves, and other ferrous-metal components.
  3. For non-galvanized railings, provide non-galvanized ferrous-metal fittings, brackets, fasteners, and sleeves, except galvanize anchors embedded in exterior masonry and concrete construction.
- H. 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.

## 2.10 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. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.
  - 1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
  - 2. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.
- D. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed products:
  - 1. Interior Stairs: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
- E. 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.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Coordinate and furnish anchorages, setting drawings, diagrams, templates, instructions, and directions for installing anchorages, including concrete inserts, weld plates, and anchor bolts. Coordinate delivery of such items to project site.

#### 3.2 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 the following:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base materials.
  - 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 that no roughness shows after finishing and welded surface matched contours of adjoining surfaces.
- G. Place and finish concrete fill for treads to comply with Division 03 Section "Cast-in-Place Concrete."
  - 1. Install abrasive nosing with anchors fully embedded in concrete. Center nosing's on tread width.
- H. Install precast concrete treads with adhesive supplied by manufacturer.

### 3.3 INSTALLING STEEL PIPE RAILINGS AND HANDRAILS

- A. Adjust handrails and 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 follows:
  - 1. Anchor posts to steel by welding directly to steel supporting members.
  - 2. Anchor handrail ends to concrete and masonry with steel round flanges welded to rail ends and anchored with post installed anchors and bolts.
- B. Attach handrails to wall with wall brackets and end fittings. Provide bracket with 1-1/2-inch 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 and wall return fittings to building construction as follows:
  - 1. Use type of bracket with flange tapped for concealed anchorage to threaded hanger bolt.

### 3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified Section 09 9600 "High-Performance Coatings".
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

END OF SECTION

SECTION 074213.23 – COLUMN COVERS

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 metal column surrounds.

1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  1. Meet with Owner, Architect, Owner's insurer if applicable, metal column surround Installer, column surround manufacturer's representative, structural-support Installer, and installers whose work interfaces with or affects column surrounds, 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 column surround 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 column surround materials.
  6. Review governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.
  7. Review temporary protection requirements for metal column surround assembly during and after installation.
  8. Review procedures for repair of panels damaged after installation.
  9. Document proceedings, including corrective measures and actions required, and furnish copy of record to each participant.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of panel and accessory.
- B. Shop Drawings:

1. Include fabrication and installation layouts of metal column surrounds; details of joints, panel profiles, anchorages, attachment assembly, trim, flashings, closures, and accessories; and special details.
  2. Accessories: Include details of the flashing, trim and anchorage, at a scale of not less than 1-1/2 inches per 12 inches.
- C. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
1. Metal Panels: 12 inches long by actual panel width. Include fasteners, closures, and other column surround accessories.
- 1.5 INFORMATIONAL SUBMITTALS
- A. Qualification Data: For Installer.
  - B. Product Test Reports: For each product, tests performed by a qualified testing agency.
  - C. Sample Warranties: For special warranties.
- 1.6 CLOSEOUT SUBMITTALS
- A. Maintenance Data: For metal panels to include in maintenance manuals.
- 1.7 QUALITY ASSURANCE
- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- 1.8 DELIVERY, STORAGE, AND HANDLING
- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
  - B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
  - C. Retain strippable protective covering on metal panels during installation.
- 1.9 FIELD CONDITIONS
- A. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.

1.10 COORDINATION

- A. Coordinate metal column surround installation with flashing, trim, construction of soffits, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.11 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including rupturing, cracking, or puncturing.
    - b. Deterioration of metals and other materials beyond normal weathering.
  - 2. Warranty Period: Five 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 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

2.2 METAL COLUMN SURROUNDS

- A. Metal Column Surround Systems: Provide factory-formed and -assembled, formed into profile for installation method indicated. Include attachment assembly components, and accessories required for weathertight system.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Aluminum Series 3000 column surrounds as manufactured by CENTRIA Architectural Systems or comparable product by one of the following:
    - a. Construction Services, Inc.
    - b. Firestone Metal Products, LLC.
    - c. Metal Sales & Services, Inc.

- B. Form column surrounds to shapes indicated from metal of type and minimum thickness indicated below. Return vertical edges and bend to form hook that engages mounting clips.
  - 1. Aluminum Sheet: ASTM B 209, with not less than strength and durability properties of Alloy 5005-H32, 0.080 inch thick, minimum.
  - 2. Finish: Two-coat fluoropolymer.
  - 3. Color: As selected by Architect from manufacturer's full range of colors.
  - 4. Increase metal thickness or reinforce with concealed stiffeners, backing materials, or both, as needed to provide flat surfaces where indicated.
  - 5. Support joints with concealed stiffeners as needed to hold exposed faces of adjoining sheets in flush alignment.
  - 6. Form returns at vertical joints to provide hairline V-joints.
  - 7. Fabricate column covers without horizontal joints.
  - 8. Fabricate with calk stop/stiffener ring.
  - 9. Apply manufacturer's recommended sound-deadening material to backs of column covers.
- C. Attachment Assembly Components: Formed from material compatible with panel facing.
- D. Attachment Assembly: Manufacturer's standard clip.

## 2.3 MISCELLANEOUS MATERIALS

- A. Panel Accessories: Provide components required for a complete, weathertight panel system including trim and copings, flashings, sealants, gaskets, closure strips, and similar items. Match material and finish of column surrounds unless otherwise indicated.
- B. Flashing and Trim: Provide flashing and trim formed from stainless steel or same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to bases, openings for utility devices, and top of column. Finish flashing and trim with same finish system as adjacent materials.
- C. Panel Fasteners: Self-tapping screws designed to withstand design loads. Provide concealed fasteners throughout system.

## 2.4 FABRICATION

- A. General: Fabricate and finish metal panels and accessories at the factory, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations and recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to design, dimensions, metal, and other characteristics of item indicated.
  - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
3. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended in writing by metal panel manufacturer.
  - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

## 2.5 FINISHES

- A. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Variations in appearance of abutting or adjacent pieces are acceptable if they are within one-half of the range of approved Samples. Noticeable variations in same piece are 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.
- C. Aluminum Panels and Accessories:
  1. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal panel supports, and other conditions affecting performance of the Work.
- B. Examine roughing-in for components and assemblies penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Miscellaneous Supports: Install subframing, furring, and other miscellaneous panel support members and anchorages according to ASTM C 754 and metal panel manufacturer's written recommendations.

### 3.3 COLUMN SURROUNDS INSTALLATION

- A. General: Install metal panels according to manufacturer's written instructions in orientation, sizes, and locations indicated on Drawings. Install panels perpendicular to supports unless otherwise indicated. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Shim or otherwise plumb substrates receiving metal panels.
  2. Flash and seal metal column surrounds at perimeter of all openings. Fasten with self-tapping screws.
  3. Locate and space fastenings in uniform vertical and horizontal alignment.
  4. Install flashing and trim as column surround work proceeds.
  5. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
  6. Align bottoms of metal column surrounds and fasten per manufacturer's written instructions.
- B. Fasteners:
1. Aluminum Panels: Use aluminum or stainless-steel fasteners for surfaces exposed to the exterior.
- C. Metal Protection: Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action as recommended in writing by column surround manufacturer.
- D. Attachment Assembly, General: Install attachment assembly required to support column surrounds and to provide a complete weathertight system.
1. Include attachment to supports, panel-to-panel joinery, panel-to-dissimilar-material joinery, and panel-system joint seals.
- E. Installation: Attach column surrounds to supports at locations, spacings, and with fasteners recommended by manufacturer to achieve performance requirements specified.
- F. Clip Installation: Attach panel clips to supports at locations, spacings, and with fasteners recommended by manufacturer. Attach routed-and-turned flanges of wall panels to panel clips with manufacturer's standard fasteners.
1. Seal horizontal and vertical joints between adjacent panels with sealant backing and sealant. Install sealant backing and sealant according to requirements specified in Section 07 9200 "Joint Sealants."
- G. Accessory Installation: Install accessories with positive anchorage to substrate and weathertight mounting, and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete assembly including trim, copings, seam covers, flashings, sealants, gaskets, closure strips, and similar items. Provide types indicated by column surround manufacturer; or, if not indicated, provide types recommended in writing by column surround manufacturer.
- H. 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 are permanently watertight.

1. Install exposed flashing and trim that is without buckling and tool marks and that is true to line and levels indicated, with exposed edges folded back to form hems. Install sheet metal flashing and trim to fit substrates and to result in waterproof performance.
2. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at a maximum of 10 feet with no joints allowed within 24 inches of corner or intersection. Where lapped expansion provisions cannot be used or would not be sufficiently waterproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).

#### 3.4 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align column surround units within installed tolerance of 1/4 inch in 20 feet, non-accumulative, on level, plumb, and location lines as indicated, and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

#### 3.5 CLEANING AND PROTECTION

- A. Remove temporary protective coverings and strippable films, if any, as column surrounds are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of column surround installation, clean finished surfaces as recommended by manufacturer. Maintain in a clean condition during construction.
- B. After column surround installation, clear weep holes and drainage channels of obstructions, dirt, and sealant.
- C. Replace metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION



SECTION 06 1000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DEFINITIONS

- A. Rough carpentry includes carpentry work not specified as part of other Sections and generally not exposed, unless otherwise specified.

1.3 DELIVERY, STORAGE, AND HANDLING

- A. Delivery and Storage: Keep materials under cover and dry. Protect against exposure to weather and contact with damp or wet surfaces. Stack lumber as well as plywood and other panels; provide for air circulation within and around stacks and under temporary coverings including polyethylene and similar materials.
  - 1. For lumber and plywood pressure treated with waterborne chemicals, place spacers between each bundle to provide air circulation.

PART 2 - PRODUCTS

2.1 LUMBER, GENERAL

- A. Lumber Standards: Furnish lumber manufactured to comply with PS 20 "American Softwood Lumber Standard" and with applicable grading rules of inspection agencies certified by American Lumber Standards Committee's (ALSC) Board of Review.
- B. Inspection Agencies: Inspection agencies and the abbreviations used to reference them with lumber grades and species include the following:
  - 1. WCLIB - West Coast Lumber Inspection Bureau.
  - 2. WWPA - Western Wood Products Association.
- C. Grade Stamps: Provide lumber with each piece factory-marked with grade stamp of inspection agency evidencing compliance with grading rule requirements and identifying grading agency, grade, species, moisture content at time of surfacing, and mill.
  - 1. For exposed lumber furnish pieces with grade stamps applied to ends or back of each piece; or omit grade stamps entirely and provide certificates of grade compliance issued by inspection agency.
- D. Nominal sizes are indicated, except as shown by detail dimensions. Provide actual sizes as required by PS 20, for moisture content specified for each use.
  - 1. Provide dressed lumber, S4S, unless otherwise indicated.

## 2.2 SUBFLOORING AND UNDERLAYMENT

- A. Plywood Combination Subfloor-Underlayment: DOC PS 1, Exposure 1, Underlayment single-floor panels.
  - 1. Span Rating: Not less 32.
  - 2. Nominal Thickness: Not less than 7/8 inch.
  - 3. Edge Detail: Tongue and groove.
  - 4. Surface Finish: Fully sanded face.

## 2.3 MISCELLANEOUS LUMBER

- A. General: Provide lumber for support or attachment of other construction including bucks, nailers, blocking, furring, and similar members.
- B. Fabricate miscellaneous lumber from dimension lumber of sizes indicated and into shapes shown.
- C. Moisture Content: 19 percent maximum for lumber items not specified to receive wood preservative treatment; hem-fir or hem-fir (north), Construction or No. 2 Common grade.
- D. For concealed boards including subframing for judges stand, provide lumber with 19 percent maximum moisture content and any of the following species and grades:
  - 1. Northern species, No. 2 Common grade; NLGA.
- E. 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.
- F. 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.

## 2.4 CONSTRUCTION PANELS FOR BACKING

- A. Plywood Backing Panels: For mounting electrical or telephone equipment, provide fire-retardant-treated plywood panels with grade designation, APA C-D PLUGGED EXPOSURE 1, in thickness indicated, or, if not otherwise indicated, not less than 15/32 inch.

## 2.5 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. Where rough carpentry is exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with a hot-dip zinc coating per ASTM A 153 or of AISI Type 304 stainless steel.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Wood Screws: ANSI B18.6.1.
- D. Screws for Fastening Decking to Wood Framing: ASTM C 1002.

- E. Power-Driven Fasteners: Fastener systems with an evaluation report acceptable to authorities having jurisdiction, based on ICC-ES AC70.
- F. Wood Screws: ASME B18.6.1.
- G. Lag Bolts: ASME B18.2.1 (ASME B18.2.3.8M).
- H. Bolts: Steel bolts complying with ASTM F 1554, Grade 36; with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.
- I. 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). Use if attaching to pressure-treated wood.

## 2.6 PRESERVATIVE WOOD TREATMENT BY PRESSURE PROCESS

- A. General: Where lumber or plywood is indicated as preservative-treated wood or is specified herein to be treated, comply with applicable requirements of AWWA Standards C2 (Lumber) and C9 (Plywood). Mark each treated item with the AWPB or SPIB Quality Mark Requirements.
- B. For interior uses, after treatment, kiln-dry lumber and plywood to a maximum moisture content, respectively, of 19 percent and 15 percent. Treat indicated items and the following:
  - 1. Wood nailers, blocking, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  - 2. Wood furring, stripping, and similar concealed members in contact with masonry or concrete.
- C. Pressure-treat wood members in contact with the ground or fresh water with water-borne preservatives to a minimum retention of 0.40 pcf.
- D. Complete fabrication of treated items prior to treatment, where possible. If cut after treatment, coat cut surfaces to comply with AWWA M4. Inspect each piece of lumber or plywood after drying and discard damaged or defective pieces.

## 2.7 FIRE-RETARDANT TREATMENT BY PRESSURE PROCESS

- A. General: Where fire-retardant-treated wood is indicated, pressure impregnate lumber and plywood with fire-retardant chemicals to comply with AWWA C20 and C27, respectively, for treatment type indicated; identify "fire-retardant-treated wood" with appropriate classification marking of Underwriters Laboratories, Inc., U.S. Testing, Timber Products Inspection, Inc. or other testing and inspecting agency acceptable to authorities having jurisdiction.

- B. Interior: For interior locations use fire-retardant chemical formulation that produces treated lumber and plywood with the following properties under conditions present after installation:
  - 1. No reduction takes place in bending strength, stiffness, and fastener holding capacities below values published by manufacturer of chemical formulation that are based on tests by a qualified independent testing laboratory of treated wood products identical to those indicated for this Project under elevated temperature and humidity conditions simulating installed conditions.
  - 2. No other form of degradation occurs due to acid hydrolysis or other causes related to manufacture and treatment.
  - 3. No corrosion of metal fasteners results from their contact with treated wood.
- C. Exterior Type: Use for exterior locations and where indicated.
- D. Inspect each piece of treated lumber or plywood after drying and discard damaged or defective pieces.
- E. Products: Subject to compliance with requirements, provide one of the following:
  - 1. Interior Type A Fire-Retardant-Treated Wood:
    - a. "Dricon," Arch Wood Protection, Inc..
    - b. "Pyro-Guard," Hoover Treated Wood Products.
    - c. "FirePRO," Osmose, Inc.
  - 2. Exterior Type Fire-Retardant-Treated Wood:
    - a. "FRX," Arch Wood Protection, Inc.
    - b. "Exterior Fire-X," Hoover Treated Wood Products.

## 2.8 WOOD ROOFING SYSTEM NAILERS

- A. Provide preservative treated wood nailers at all locations required by the roofing system manufacturer and/or as indicated on the roof details.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Discard units of material with defects that impair quality of rough carpentry construction and that are too small to use in fabricating rough carpentry with minimum joints or optimum joint arrangement.
- B. Set rough carpentry to required levels and lines, with members plumb and true to line and cut and fitted.
- C. Fit rough carpentry to other construction; scribe and cope as required for accurate fit. Correlate location of furring, nailers, blocking, grounds, and similar supports to allow attachment of other construction.
- D. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. ICC-ES evaluation report for fastener.

- E. Countersink nail heads on exposed carpentry work and fill holes.
- F. Use common wire nails, unless otherwise indicated. Use finishing nails for finish work. Select fasteners of size that will not penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting of wood; predrill as required.
- G. Supports: Install framing to adequately support suspended brackets, grid, and screens; see plans for locations and details for requirements.
- H. Roofing Nailers: Install nailers as recommended and approved by the roofing system manufacturer. Coordinate with substrate materials and conditions and with roof insulation ply thicknesses.

### 3.2 WOOD STRUCTURAL PANEL INSTALLATION

- A. General: Comply with applicable recommendations in APA Form No. E30, "Engineered Wood Construction Guide," for types of structural-use panels and applications indicated.
- B. Fastening Methods: Fasten panels as indicated below:
  - 1. Combination Subfloor-Underlayment:
    - a. Glue and screw to wood framing.

END OF SECTION



## SECTION 06 4023 - INTERIOR ARCHITECTURAL WOODWORK

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Refer to Division 12 Section "Manufactured Plastic-Laminate-Clad Casework" for modular (manufactured) casework.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Interior standing and running trim.
  - 2. Wood furnishings in Court Room.
  - 3. Countertops (plastic laminate and stainless-steel finished).
  - 4. Flush wood paneling in Court Room.
  - 5. Storage shelving and related hardware.
  - 6. Solid-surfacing material countertops.
  - 7. Bullet Resistant Armor in Judges bench.
  - 8. Related hardware.

#### 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 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated, including cabinet hardware and accessories, and finishing materials and processes.
- B. Shop Drawings: Show location of each item, dimensioned plans and elevations, large-scale details, attachment devices, and other components.
- C. Samples for Verification: For the following:
  - 1. Lumber with or for transparent finish, 5-inches wide by 24 inches long, for each species and cut, finished on 1 side and 1 edge.
  - 2. Wood-veneer-faced panel products with or for transparent finish, 12 by 24 inches, for each species, cut, and finish. Include at least one face-veneer seam and finish as specified.
  - 3. Plastic-laminate-clad panel and solid-surfacing products, 8 by 10 inches, for each type, color, pattern, and surface finish.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Certificates: Signed by manufacturers of woodwork certifying that products furnished comply with requirements.
- B. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of Architects and Owners, and other information specified.
- C. Test Data: For bullet-resistant-armor.

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 or certified participant in AWI's Quality Certification Program.
- C. Quality Standard: Unless otherwise indicated, comply with AWI's "Architectural Woodwork Quality Standards" for grades of interior architectural woodwork, construction, finishes, and other requirements.
- D. Preconstruction Conference: Before fabrication of interior architectural woodwork and associated Work, meet at mutually agreed location with Installer, woodworking fabrication representative, installers of related work, and other entities concerned with finish product performance, including Architect, and Owner. Record discussions and agreements and furnish copy to each participant. Provide at least 5 working days advance notice to participants prior to convening preconstruction conference

1.7 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.

1.8 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 will maintain temperature between 60 and 90 deg F and relative humidity between 17 and 50 percent during the remainder of the construction period.

- B. 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.

## 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 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 the AWI quality standard for each type of woodwork and quality grade specified, unless otherwise indicated.
- B. Wood Species and Cut for Transparent Finish: As indicated on Drawings.
  - 1.
- C. Wood Products: Comply with the following:
  - 1. Hardboard: AHA A135.4.
  - 2. Medium-Density Fiberboard: ANSI A208.2.
  - 3. Particleboard: ANSI A208.1.
    - a. Provide particleboard with Grade M-2-Exterior Glue to eliminate formaldehyde from resins.
  - 4. Softwood Plywood: DOC PS 1.
  - 5. Hardwood Plywood and Face Veneers: HPVA HP-1.
- D. Thermoset Decorative Overlay: Particleboard complying with ANSI A208.1, Grade M-2-Exterior Glue, or medium-density fiberboard complying with ANSI A208.2, Grade MD (made with binder containing no urea formaldehyde), with surface of thermally fused, melamine-impregnated decorative paper complying with LMA SAT-1.
  - 1. Note: This product is acceptable for interior finish of cabinets only.
- E. High-Pressure Decorative Laminate: NEMA LD 3, grades as indicated, or if not indicated, as required by woodwork quality standard.
  - 1. Manufacturer: Subject to compliance with requirements, provide high-pressure decorative laminates by one of the following:
    - a. Formica Corporation.
    - b. Laminart.
    - c. Nevamar Corp.
    - d. Wilsonart International.

- F. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with material and performance requirements in ANSI Z124.3, for Type 5 or Type 6, without a precoated finish.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Avonite; Avonite, Inc.
    - b. Corian; DuPont Polymers.
    - c. Surell; Formica Corporation.
    - d. Fountainhead; International Paper, Decorative Products Div.
    - e. Gibraltar; Wilsonart International.
- G. Bullet Resistant Armor: Multi-layer laminated woven fiberglass panels.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Safeguard Security Services, Inc; Armortex.
    - b. GE Polymershapes; Insulgard.
    - c. North American Bulletproofing; ShotGard.
- H. Adhesive for Bonding Plastic Laminate: Contact cement, for general use and for postforming. Use unpigmented product with through-color laminate.
1. Adhesive for Bonding Edges: Hot-melt adhesive or adhesive specified above for faces.

## 2.2 CABINET HARDWARE AND ACCESSORIES

- A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets provided under this Section.
- B. Hardware Standard: Comply with BHMA A156.9 for items indicated by referencing BHMA numbers or items referenced to this standard. Minimum quality level: Type 2 (Institutional).
- C. Butt Hinges: 2-3/4-inch, 5-knuckle steel hinges made from 0.095-inch-thick metal, and as follows:
1. Semic concealed Hinges for Overlay Doors: BHMA A156.9, B01521.
- D. Back-Mounted Pulls: BHMA A156.9, B02011.
- E. Adjustable Shelf Standards and Supports: BHMA A156.9, B04071; with shelf rests, B04081.
- F. Shelf Rests: BHMA A156.9, B04013.
- G. Drawer Slides: Blum or approved alternate. Side-mounted, full-extension, zinc-plated steel drawer slides with steel ball bearings, BHMA A156.9, B05091, and rated for the following loads:
1. Pencil Drawer Slides: 45 lbf.
  2. Box Drawer Slides: 100 lbf.
  3. File Drawer Slides: 150 lbf.
  4. Keyboard Slide: 75 lbf.
- H. Door Locks: BHMA A156.11, E07121.
- I. Drawer Locks: BHMA A156.11, E07041.

- J. Grommets for Cable Passage through Countertops: Minimum 2-1/2-inch OD, molded-plastic grommets and matching plastic caps with slot for wire passage. Color: Match adjacent finish.
- K. Exposed Hardware Finishes: For exposed hardware, provide finish that complies with BHMA A156.18 for BHMA finish number indicated.
  - 1. Satin Chromium Plated: BHMA 626 for brass or bronze base; BHMA 652 for steel base.
- L. For concealed hardware, provide manufacturer's standard finish that complies with product class requirements in BHMA A156.9.
- M. Accessories: Products by Nissen & Co., Inc. except as noted otherwise.
  - 1. Speak Hole: #444 louver type opening; 4-1/2-inches o.d.

### 2.3 INSTALLATION MATERIALS

- A. 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.
- B. Handrail Brackets: Cast from malleable iron with wall flange drilled and tapped for concealed hanger bolt and with support arm for screwing to underside of rail. Sized to provide 1-1/2-inch clearance between handrail and wall.

### 2.4 FABRICATION, GENERAL

- A. Interior Woodwork Grade: Provide Custom Grade interior woodwork complying with the 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 Thick or Less: 1/16 inch.
  - 2. Edges of Rails and Similar Members More Than 3/4 Inch Thick: 1/8 inch.
- 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.
- 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.

## 2.5 INTERIOR WOOD FOR TRANSPARENT FINISH

- A. Quality Standard: Comply with AWI Section 300.
- B. Grade: Custom.
- C. Backout or groove backs of flat trim members and kerf backs of other wide, flat members, except for members with ends exposed in finished work.
- D. Wood Species and Cut: Refer to Paragraph 2.1.B above.
  - 1. Matching of Veneer Leaves: Book match.
  - 2. Vertical Matching of Veneer Leaves: End match.
  - 3. Veneer Matching within Panel Face: Running match.
- E. Semiexposed Surfaces: Provide surface materials indicated below.
  - 1. Surfaces Other Than Drawer Bodies: Match species and cut indicated for exposed surface.
  - 2. Drawer Sides and Backs: Solid-hardware lumber, same species indicated for exposed surfaces.
  - 3. Drawer Bottoms: Hardwood plywood.

## 2.6 PLASTIC LAMINATE CABINETS

- A. Quality Standard: Comply with AWI Section 400 requirements for laminate cabinets.
- B. Grade: Custom.
- C. AWI Type of Cabinet Construction: As indicated.
- D. Laminate Cladding for Exposed Surfaces: High-pressure decorative laminate complying with the following requirements:
  - 1. Exposed Horizontal Surfaces: 0.050-inch minimum thickness.
  - 2. Vertical Surfaces: 0.028-inch minimum thickness.
  - 3. Edges at Drawers and Doors for Reveal Overlay Construction: 3 mm thick ABS.
  - 4. Cabinet Liners and Concealed Backing: 0.020-inch minimum thickness.
  - 5. Colors, Patterns, and Finishes:
    - a. Refer to Section 09 Section "Finish Materials and Color Schedule."
- E. Provide dust panels of 1/4-inch plywood or tempered hardboard above compartments and drawers except where located directly under tops.

## 2.7 PLASTIC-LAMINATE COUNTERTOPS

- A. Quality Standard: Comply with AWI Section 400 requirements for high-pressure decorative laminate countertops.
- B. Grade: Custom.
- C. High-Pressure Decorative Laminate Grade: HGS (0.050-inch nominal thickness, at horizontal surfaces).

- D. Colors, Patterns, and Finishes:
  - 1. Refer to Division 09 Section "Finish Materials and Color Schedule."
- E. Edge Treatment: Same as laminate cladding on horizontal surfaces.
- F. Core Material: Particleboard or medium-density fiberboard.
- G. Core Material at Sinks: Particleboard made with exterior glue.

## 2.8 FLUSH WOOD PANELING

- A. Quality Standard: Comply with AWI Section 500 requirements for flush wood paneling.
- B. Grade: Custom.
- C. Wood Species and Cut: Select White Birch, rotary sliced.
- D. Matching of Adjacent Veneer Leaves: Book match.
- E. Colors, Patterns, and Finishes:
  - 1. Refer to Division 09 Section "Finish Materials and Color Schedule."
  - 2. Provide finished black edge of panel.
- F. Veneer Matching within Panel Face: Running match.
- G. Panel-Matching Method: Match panels within each separate area by the following method:
  - 1. Premanufactured sets selectively reduced in width.
- H. Fire-Retardant-Treated Paneling: Not required.

## 2.9 PLASTIC-LAMINATE STORAGE SHELVING

- A. Quality Standard: Comply with AWI Section 600 requirements for high-pressure decorative laminate utility shelving.
- B. Grade: Custom.
- C. High-Pressure Decorative Laminate Grade: HGS (0.050-inch nominal thickness, at horizontal surfaces).
- D. Color, Pattern, and Finish:
  - 1. Refer to Division 09 Section "Finish Materials and Color Schedule."
- E. Edge Treatment: Same as laminate cladding on horizontal surfaces.
- F. Core Material: High-performance (47-lb. density) particleboard, balanced construction.
  - 1. Standard Shelving: 3/4-inch thick, maximum 29 inches wide.
  - 2. Shelves 30 inches wide and over: One-inch-thick core material.
  - 3. Where shown: One-inch-thick core material.

2.10 SOLID-SURFACING-MATERIAL COUNTERTOPS

- A. Quality Standard: Comply with AWI Section 400 requirements for countertops.
- B. Grade: Custom.
- C. Solid-Surfacing-Material Thickness: 1/2 inch.
- D. Colors, Patterns, and Finishes: Provide materials and products that result in colors of solid-surfacing material complying with the following requirements:
  - 1. Colors:
    - a. Refer to Division 09 Section "Finish Materials and Color Schedule."
  - 2. Note: Color listed is by Corian, but similar colors by other manufacturers listed in Paragraph 2.1.F. above are acceptable upon Architect's approval.
- E. Fabricate tops in one piece with shop-applied backsplashes and edges, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
- F. Drill holes in countertops for plumbing fittings and soap dispensers in shop.

2.11 BULLET RESISTANT ARMOR

- A. General: Provide bullet resistant armor of types indicated in maximum lengths available to minimize end-to-end butt joints. Fiberglass to be of the "non-ricochet" type.
  - 1. Thickness: Provide bullet resistant armor in 7/16 inch thickness to comply with UL 752 listed Level 3 bullet resistant fiberglass.
- B. Panels shall be made of multiple layers of starch-oil woven ballistic grade fiberglass cloth impregnated with a thermoset polyester resin and compressed into flat rigid sheets. The production technique and materials used shall provide the controlled internal delamination to permit the encapture of a penetrating projectile.
- C. Unlisted bullet resistant armor will not be considered acceptable or equal.

2.12 SHOP FINISHING

- A. Quality Standard: Comply with AWI Section 1500, unless otherwise indicated.
  - 1. Grade: Provide finishes of same grades as items to be finished.
- B. General: Finish architectural woodwork at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- C. Preparations for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural woodwork, as applicable to each unit of work.
  - 1. Backpriming: Apply one coat of sealer or primer, compatible with finish coats, to concealed surfaces of woodwork. Concealed surfaces of plastic-laminate-clad woodwork

do not require backpriming when surfaced with plastic laminate, backing paper, or thermoset decorative overlay.

- D. Transparent Finish: Comply with requirements indicated below for grade, finish system, staining, and sheen, with sheen measured on 60-degree gloss meter per ASTM D 523.
  - 1. Grade: Custom.
  - 2. AWI Finish System TR-6: Catalyzed polyurethane to match finish of wood doors specified in Division 8.
  - 3. Staining: None required.
  - 4. Sheen: Satin, 30-50 gloss units.

### PART 3 - EXECUTION

#### 3.1 PREPARATION

- A. Condition woodwork to average prevailing humidity conditions in installation areas before installation.
- 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. Quality Standard: Install woodwork to comply with AWI Section 1700 for the same grade specified in Part 2 of this Section for type of woodwork involved.
- B. 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.
- C. Scribe and cut woodwork to fit adjoining work, and refinish cut surfaces and repair damaged finish at cuts.
- D. 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.
- E. Install bullet resistant armor behind paneling at judges bench as indicated on Drawings and per manufacturer's written instruction.
- F. Standing and Running Trim: Install with minimum number of joints possible, using full-length pieces (from maximum length of lumber available) to greatest extent possible. Do not use pieces less than 60 inches long, except where shorter single-length pieces are necessary. Scarf running joints and stagger in adjacent and related members.
  - 1. Install standing and running trim with no more variation from a straight line than 1/8 inch in 96 inches.

- G. 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 sag, bow, or other variation from a straight line.
- H. 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 sag, bow, or other variation from a straight line.
- I. Paneling: Anchor paneling to supporting substrate with face fastening where fasteners are to be covered by trim
  - 1. Install flush paneling with no more than 1/16 inch in 96-inch vertical cup or bow and 1/8 inch in 96-inch horizontal variation from a true plane.
- J. Storage Shelving: Anchor steel standards at locations shown, in accordance with manufacturer's recommendations for substrate, and in accordance with AWI Section 600.
- K. Grommets: Drill grommet holes on-site after equipment layout is determined by Owner.
- L. Complete the finishing work specified in this Section to extent not completed at shop or before installation of woodwork.

### 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.

END OF SECTION

## SECTION 07 1113 - 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, emulsified-asphalt dampproofing.
  - 2. Drain board/protection board.

#### 1.3 ACTION SUBMITTALS

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

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For qualified Installer.
- B. Certificates: manufacturer's current ISO certification including the manufacturing of the membrane, primer, mastics, adhesives and protection board..

#### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for dampproofing installation indicated.
- B. Contractor shall maintain one copy of manufacturer's literature on site throughout the execution of dampproofing Work.

#### 1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to the job site in undamaged and original packaging indicating the name of the manufacturer and product.
- B. Cold applied elastomeric membrane should be stored in closed containers outdoors.
- C. Store adhesives and primers at temperatures of 40 degrees F and above to facilitate handling.

- D. Keep solvents away from open flame or excessive heat.

#### 1.7 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.

### PART 2 - PRODUCTS

#### 2.1 MATERIALS, GENERAL

- A. Source Limitations: Obtain primary dampproofing materials and primers from single source from single manufacturer. Provide protection course 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, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. BASF Construction Chemicals - Building Systems; Sonneborn Brand Products.
  2. ChemMasters, Inc.
  3. Euclid Chemical Company (The); an RPM company.
  4. Henry Company.
  5. Meadows, W. R., Inc.
- B. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.

#### 2.3 AUXILIARY MATERIALS

- A. General: Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.
- B. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.
- C. Protection Course: ASTM D 6506, 1/8-inch-thick, semirigid sheets of fiberglass or mineral-reinforced-asphaltic core, pressure laminated between two asphalt-saturated fibrous liners.

### 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.
- 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.
- B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches over outside face of footing.

#### 3.4 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

- A. Unexposed Face of Masonry Retaining Walls: Apply primer and one brush or spray coat at not less than 1.25 gal./100 sq. ft. Apply dampproofing in continuous fashion along wall and across top of foundation.

3.5 INSTALLATION OF PROTECTION COURSE

- A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing-material and protection-course manufacturers' written instructions for attaching protection course.
  - 1. Support protection course over cured coating with spot application of adhesive type recommended in writing by protection-board manufacturer.
  - 2. Install protection course on same day of installation of dampproofing (while coating is tacky) to ensure adhesion.

3.6 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

## SECTION 07 2100 - THERMAL INSULATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Refer to Division 09 Section "Acoustic Insulation" for acoustical insulation.

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Blanket/batt insulation.
  - 2. Polyisocyanurate foam-plastic board.
  - 3. Fire safing insulation.

#### 1.3 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Provide insulation materials identical to those whose indicated fire performance characteristics have been determined per the ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting organization.
  - 1. Surface Burning Characteristic: ASTM E 84.
  - 2. Fire Resistance Ratings: ASTM E 119.
  - 3. Combustion Characteristics: ASTM E 136.
- B. Single-Source Responsibility for Insulation Products: Obtain each type of building insulation from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide insulation products of one of the following:

1. Manufacturers of Glass Fiber Insulation:
  - a. CertainTeed Corp.
  - b. Johns Manville Insulations.
  - c. Owens-Corning Fiberglas Corp.
  - d. Knauf Insulation.
2. Manufacturers of Polyisocyanurate Foam-Plastic Board Insulation:
  - a. Atlas Roofing Corporation.
  - b. Dow Chemical Company (The).
  - c. Hunter Panels.
  - d. Johns Manville.
  - e. Rmax, Inc.
3. Manufacturer of Fire Safing Insulation:
  - a. Rolux, Inc.
  - b. Thermafiber, Inc.

## 2.2 INSULATING MATERIALS

- A. General: Provide insulating materials that comply with requirements and with referenced standards.
  1. Preformed Units: Sizes to fit applications indicated, selected from manufacturer's standard thicknesses, widths, and lengths.
  2. Typical R-values:
    - a. Batts at stud walls shall in thicknesses shown, typically unfaced unless otherwise specified, required by code or shown.
- B. Unfaced Mineral-Fiber Blanket Insulation: Thermal insulation combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665, Type I (blankets without membrane facing).
  1. Mineral Fiber Type: Fibers manufactured from glass.
  2. Surface Burning Characteristics: Maximum flame-spread and smoke-developed index of 20.
- C. Faced Mineral Fiber Blanket/Batt Insulation: Thermal insulation produced by combining mineral fibers of type described below with thermosetting resins to comply with ASTM C 665 for Type III, Class A (blankets with reflective vapor-retarder membrane facing with flame spread of 25 or less); foil-scrim-kraft or foil-scrim-polyethylene vapor-retarder membrane on one face, and as follows:
  1. Mineral Fiber Type: Fibers manufactured from glass.
  2. Surface Burning Characteristics: Maximum flame spread and smoke developed values of 25 and 50, respectively.
- D. Polyisocyanurate Board, Foil Faced: ASTM C 1289, foil faced, Type I, Class 1 or 2.
  1. Adhesive for Bonding Insulation: Product compatible with insulation and air and water barrier materials, and with demonstrated capability to bond insulation securely to substrates without damaging insulation and substrates.

## 2.3 SAFING INSULATION AND ACCESSORIES

- A. Safing insulation shall be Thermafiber, Inc. mineral fiber safing insulation, unfaced. Insulation shall comply with ASTM C 612, Types 1A and 1B; and have nominal 4.0 pcf density.

- B. Sealant shall be as approved by manufacturer of safining insulation for conditions shown.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates and conditions with Installer present, for compliance with requirements of the Sections in which substrates and related work are specified and to determine if other conditions affecting performance of insulation are satisfactory. Do not proceed with installation of insulation until unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Clean substrates of substances harmful to insulations or vapor retarders, including removal of projections that might puncture vapor retarders.

#### 3.3 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's instructions applicable to products and application indicated. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with installation of insulation.
- B. Extend insulation full thickness as indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections that interfere with placement.
- C. Apply a single layer of insulation of required thickness, unless otherwise shown or required to make up total thickness.

#### 3.4 INSTALLATION OF GENERAL BUILDING INSULATION

- A. Apply insulation units to substrate by method indicated, complying with manufacturer's recommendations. If no specific method is indicated, use mechanical anchorage to provide permanent placement and support of units. Place insulation on soffits, at roof framing, at exterior wall construction, and where shown on Drawings in manner to insure continuous thermal barrier.
- B. Install unfaced batts and boards in wall framing where shown. Friction fit.
  - 1. Install batts above termination of gypsum wallboard utilizing 18 gauge wire perpendicular to the batt at 18 inches on center, or attach pin anchor at intervals required by insulation manufacturer.
- C. Set reflective, foil-faced units accurately with not less than 0.75-inch air space in front of foil. Set foil face to warm side of construction unless shown otherwise.
  - 1. Insulation in attic at plenum spaces and where insulation will be exposed to view shall be Type III foil-scrim-Kraft faced.

3.5 INSTALLATION OF RIGID BOARD INSULATION

- A. Foam-Plastic Board Insulation: Install pads using mechanical fasteners per manufacturer's written instructions.

3.6 INSTALLATION OF SAFING INSULATION

- A. Install safing insulation to fill gap between top of partition and horizontal material above, or as otherwise shown on Drawings. Apply sealant to complete safing assembly.

3.7 PROTECTION

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

END OF SECTION

SECTION 07 2600 - UNDER-SLAB VAPOR RETARDER

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Refer to Division 03 Section "Cast-In-Place Concrete" for concrete slab.

1.2 SUMMARY

- A. Section includes under-slab vapor retarder, seam tape, mastic and pipe boots for installation under concrete slabs.

1.3 REFERENCES

- A. American Society for Testing and Materials (ASTM):
  - 1. ASTM E 1745 Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill Under Concrete Slabs.
  - 2. ASTM E 154 Standard Test Methods for Water Vapor Retarders Used in Contact with Earth Under Concrete Slabs.
  - 3. ASTM E 1249 Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor.
  - 4. ASTM E 1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs.
- B. American Concrete Institute (ACI):
  - 1. ACI 302.1R Vapor Barrier Component (plastic membrane).

1.4 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. Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.5 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain materials for system from one source and by a single manufacturer or by manufacturers approved by the system manufacturer as compatible with other system components.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
1. Insulation Solutions, Inc.
  2. Raven Industries.
  3. Stego Industries.
  4. W.R. Meadows, Inc.
  5. Poly America.

### 2.2 MATERIALS

- A. Vapor retarder membrane must have the following properties:
- |                                   |               |                           |
|-----------------------------------|---------------|---------------------------|
| 1. Minimum Permeance              | ASTM E96      | 0.04 Perms                |
| 2. Water Vapor Barrier            | ASTM E1745    | Meets or exceeds Class A. |
| 3. Thickness of Barrier (plastic) | ACI 302.1 R96 | Not less than 15 mils     |

### 2.3 ACCESSORIES

- A. Seaming Tape: Manufacturer's standard 4-inch seaming tape.
- B. Pipe Boot Kits: Manufacturer's standard pipe boot kits.
- C. Perimeter Termination: Manufacturer's standard perimeter termination system.

## PART 3 - EXECUTION

### 3.1 PREPARATION

- A. Ensure that subsoil is approved by Engineer or Geotechnical firm.
1. Level and tamp or roll aggregate, sand or tamped earth base.

### 3.2 INSTALLATION

- A. Install under-slab vapor retarder in accordance with manufacturer's instructions and ASTM E 1643.
1. Unroll vapor retarder with the longest dimension parallel with the direction of the pour.
  2. Lap vapor retarder over footings and seal to foundation walls.
  3. Overlap joints 6 inches and seal with manufacturer's tape.
  4. Seal all penetrations (including pipes) in accordance with manufacturer's instructions.
  5. No penetration of the vapor retarder is allowed except for reinforcing steel and permanent utilities.
  6. Repair damaged areas by cutting patches of vapor retarder, overlapping damaged area 6 inches and taping all four sides with tape.

END OF SECTION

## SECTION 07 5423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Mechanically fastened thermoplastic polyolefin (TPO) roofing system.
  - 2. Roof insulation.
- B. Related Requirements:
  - 1. Section 06 1000 "Rough Carpentry" for wood nailers, curbs, and blocking; and for wood-based, structural-use roof deck panels.
  - 2. Section 07 6200 "Sheet Metal Flashing and Trim" for metal roof flashings and counterflashings.
  - 3. Section 07 7129 "Manufactured Roof Expansion Joints" for proprietary manufactured roof expansion-joint assemblies.
  - 4. Section 07 9200 "Joint Sealants" for joint sealants, joint fillers, and joint preparation.
  - 5. Section 22 1423 "Storm Drainage Piping Specialties" for roof drains.

#### 1.3 DEFINITIONS

- A. Roofing Terminology: Definitions in ASTM D 1079 and glossary in NRCA's "The NRCA Roofing and Waterproofing Manual" apply to work of this Section.

#### 1.4 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. 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, fastening spacings, and patterns for mechanically fastened roofing.
4. Insulation fastening patterns for corner, perimeter, and field-of-roof locations.

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. Test Reports: Submit manufacturer's FM Global "RoogNAV" report, compiled with materials to be used for this Project, showing roofing system meets requirements of Factory Mutual Approval Standard 4450 without use of substrate board (thermal barrier) as required by IBC 2006, Section 2603.4.1.5.
- D. Research/Evaluation Reports: For components of roofing system, from ICC-ES.
- E. 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 FM Global 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. 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.
- C. 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 roofing, base flashings, roof insulation, fasteners, cover boards, roofing accessories, and other components of roofing system.
  2. Warranty Period: 15 years from date of Substantial Completion, NDL.
- B. Special Project Warranty: Submit roofing Installer's warranty, on warranty form at end of this Section, signed by Installer, covering the Work of this Section, including all components of roofing system such as roofing, base flashing, roof insulation, fasteners, cover boards, substrate boards, vapor retarders, roof pavers, and walkway products, for the following warranty period:
1. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
1. Carlisle SynTec Incorporated.
  2. Firestone Building Products.
  3. GAF Materials Corporation.
- B. Source Limitations: Obtain components including roof insulation, fasteners, and accessories for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer, complying with testing requirements of system.

### 2.2 PERFORMANCE REQUIREMENTS

- A. General Performance: Installed roofing and base flashings shall withstand specified uplift pressures, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Roofing and base flashings shall remain watertight.
1. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
  2. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.
- B. Material Compatibility: Roofing materials shall be compatible with one another and adjacent materials under conditions of service and application required, as demonstrated by roofing manufacturer based on testing and field experience.
- C. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures:
1. Corner Uplift Pressure: 120 lbf / sq. ft.
  2. Perimeter Uplift Pressure: 110 lbf. / sq. ft.
  3. Field-of-Roof Uplift Pressure: 90 lbf. / sq. ft.
- D. FM Global Listing: Roofing, base flashings, and component materials shall comply with requirements in FM Global 4450 or FM Global 4470 as part of a built-up roofing system, and

shall be listed in FM Global's "RoofNav" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.

1. Fire/Windstorm Classification: Class 1A-90.
2. Hail-Resistance Rating: MH.

- E. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
- F. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.
- G. Energy Performance: Roofing system shall have an initial solar reflectance of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.
- H. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class B; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
- I. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

## 2.3 TPO ROOFING

- A. Fabric-Reinforced TPO Sheet: ASTM D 6878, internally fabric- or scrim-reinforced, uniform, flexible TPO sheet.
  1. Thickness: 60 mils, nominal.
  2. Exposed Face Color: White.

## 2.4 AUXILIARY ROOFING MATERIALS

- A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.
  1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.
- B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils thick, minimum, of same color as TPO sheet.
- C. Metal Termination Bars: Manufacturer's standard, predrilled stainless-steel or aluminum bars, approximately 1 by 1/8 inch thick; with anchors.
- 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 TPO 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 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 and cover boards to substrate, and acceptable to roofing system manufacturer.
- C. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer as follows:
  - 1. Bead-applied, low-rise, one-component or multicomponent urethane adhesive.
- D. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch thick.

## 2.7 WALKWAYS

- A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads, approximately 3/16 inch thick and acceptable to roofing system manufacturer.
  - 1. Colors and Textures: 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 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.
3. Verify that surface plane flatness and fastening of steel roof deck complies with requirements in Section 05 3100 "Steel Decking."

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. Install insulation in two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches in each direction.
  1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.
  2. Thickness: As required to achieve a minimum LTTR Value of 30.
- 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 with insulation.
  - 1. Cut and fit insulation within 1/4 inch of nailers, projections, and penetrations.
- G. Mechanically Fastened and Adhered Insulation: Install each layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.
  - 1. Fasten first layer of insulation according to requirements in FM Global's "RoofNav" for specified Windstorm Resistance Classification.
  - 2. Set each subsequent layer of insulation in ribbons of bead-applied insulation adhesive, firmly pressing and maintaining insulation in place.
- H. Install cover boards over insulation with long joints in continuous straight lines with end joints staggered between rows. Offset joints of insulation below a minimum of 6 inches in each direction. Loosely butt cover boards together and fasten to roof deck.
  - 1. Fasten cover boards according to requirements in FM Global's "RoofNav" for specified Windstorm Resistance Classification.

### 3.5 MECHANICALLY FASTENED ROOFING INSTALLATION

- A. Mechanically fasten roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.
  - 1. For in-splice attachment, install roofing with long dimension perpendicular to steel roof deck flutes.
- B. Where required for manufacturer's warranty, start installation of roofing in presence of roofing system manufacturer's technical personnel.
- C. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
- D. Mechanically fasten or adhere roofing securely at terminations, penetrations, and perimeter of roofing.
- E. Apply roofing with side laps shingled with slope of roof deck where possible.
- F. In-Seam Attachment: Secure one edge of TPO sheet using fastening plates or metal battens centered within seam, and mechanically fasten TPO sheet to roof deck.
- G. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
  - 1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
  - 2. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.
- H. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

### 3.6 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. Final Roof Inspection: Arrange for roofing system manufacturer's technical personnel to inspect roofing installation on completion.
- B. Repair or remove and replace components of roofing system where inspections indicate that they do not comply with specified requirements.
- C. 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



## SECTION 07 6200 - SHEET METAL FLASHING AND TRIM

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUBMITTALS

- A. Product Data, Flashing, Sheet Metal, and Accessories: Manufacturer's technical product data, installation instructions and general recommendations for each specified sheet material and fabricated product.
- B. Shop Drawings: Show layout, profiles, methods of joining, expansion and anchorage details. Provide layouts at 1/4-inch scale and details at 3-inch scale.
- C. Samples: Provide sample of prefinished metal for copings in manufacturer's standard size, on metal specified.
- D. Product Certificates: For each type of coping and roof edge flashing that is SPRI ES-1 tested.

#### 1.3 PROJECT CONDITIONS

- A. Coordinate work of this Section with interfacing and adjoining work for proper sequencing of each installation. Ensure best possible weather resistance and durability of work and protection of materials and finishes.

#### 1.4 QUALITY ASSURANCE

- A. Fabricator Qualifications: Employs skilled workers who custom fabricate sheet metal flashing and trim similar to that required for this Project and whose products have a record of successful in-service performance.
  - 1. For copings and roof edge flashings that are SPRI ES-1 tested, shop shall be listed as able to fabricate required details as tested and approved.

#### 1.5 PERFORMANCE REQUIREMENTS

- A. SPRI Wind Design Standard: Manufacture and install copings tested according to SPRI ES-1 and capable of resisting the following design pressure:
  - 1. Horizontal: 25 psf.
  - 2. Vertical: 66 psf.

## PART 2 - PRODUCTS

### 2.1 SHEET METAL FLASHING AND TRIM MATERIALS

- A. Zinc-Coated Steel: Commercial quality with 0.20 percent copper, ASTM A 653, G90 hot-dip galvanized, mill phosphatized where indicated for painting.
  - 1. Typical metal thickness 0.028 inch (22 gauge).
- B. Lead: ASTM B 749, Type L51121, copper-bearing sheet lead, minimum 4 lb/sq ft (0.0625-inch thick) except not less than 6 lb/sq ft (0.0937-inch thick) for burning (welding) unless otherwise indicated.
- C. Miscellaneous Materials and Accessories:
  - 1. Solder: For use with steel or copper, provide 50 - 50 tin/lead solder (ASTM B 32), with rosin flux.
  - 2. Fasteners: Same metal as flashing / sheet metal or other noncorrosive metal as recommended by sheet manufacturer. Match finish of exposed heads with material being fastened.
  - 3. Bituminous Coating: SSPC - Paint 12, solvent-type bituminous mastic, nominally free of sulfur, compounded for 15-mil dry film thickness per coat.
  - 4. Epoxy Seam Sealer: 2-part noncorrosive metal seam cementing compound, recommended by metal manufacturer for exterior / interior nonmoving joints including riveted joints.
  - 5. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, non-drying, nonmigrating sealant.
  - 6. Elastomeric Sealant: Generic type recommended by manufacturer of metal and fabricator of components being sealed and complying with requirements for joint sealants as specified in Division 07 Section "Joint Sealants."
  - 7. Adhesives: Type recommended by flashing sheet manufacturer for waterproof / weather-resistant seaming and adhesive application of flashing sheet.
  - 8. Reglets: Metal units of type and profile indicated, compatible with flashing indicated, noncorrosive. Surface applied. As manufactured by Fry Reglet, or approved equal.
  - 9. Metal Accessories: Provide sheet metal clips, straps, anchoring devices, and similar accessory units as required for installation of work, matching or compatible with material being installed, noncorrosive, size and gage required for performance.
  - 10. Concealed Flexible Flashing: Nervastral Seal-Proof HD; 0-020" gage elastomeric waterproof sheeting.

### 2.2 FABRICATED UNITS

- A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details shown and with applicable requirements of SMACNA "Architectural Sheet Metal Manual" and other recognized industry practices. Fabricate for waterproof and weather-resistant performance, with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrates. Comply with material manufacturer instructions and recommendations for forming material. Form exposed sheet metal work without excessive oil-canning, buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

- B. Seams: Fabricate nonmoving seams in sheet metal with flat-lock seams. For metal other than aluminum, tin edges to be seamed, form seams, and solder. Form aluminum seams with epoxy seam sealer; rivet joints for additional strength where required.
- C. Expansion Provisions: Where lapped or bayonet-type expansion provisions in work cannot be used or would not be sufficiently water / weatherproof, form expansion joints of intermeshing hooked flanges, not less than 1 inch deep, filled with mastic sealant (concealed within joints).
- D. Sealant Joints: Where movable, nonexpansion type joints are indicated or required for proper performance of work, form metal to provide for proper installation of elastomeric sealant, in compliance with SMACNA standards.
- E. Separations: Provide for separation of metal from noncompatible metal or corrosive substrates by coating concealed surfaces at locations of contact, with bituminous coating or other permanent separation as recommended by manufacturer / fabricator.

### 2.3 GALVANIZED STEEL SHEET FINISHES

- A. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating of type compatible with the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified to comply with ASTM A 780.
- B. Coil - Coated Galvanized Steel Sheet Finish (Fluoropolymer Coating - **Provide for Coping**): Manufacturer's standard two-coat, thermo-cured, full-strength 70 percent "Kynar 500" coating consisting of a primer and a minimum 0.75-mil dry film thickness with a total minimum dry film thickness of 0.9 mil and 30 percent reflective gloss when tested in accordance with ASTM D 523.
  - 1. Durability: Provide coating that has been field tested under normal range of weathering conditions for minimum of 20 years without significant peel, blister, flake, chip, crack, or check in finish; without chalking in excess of No. 8 in accordance with ASTM D 4214; and without fading in excess of 5 Hunter units.
  - 2. Color / Finish: Color to match clear anodic finish on curtain wall.

## PART 3 - EXECUTION

### 3.1 INSTALLATION REQUIREMENTS

- A. General: Except as otherwise indicated, comply with manufacturer's installation instructions and recommendations and with SMACNA "Architectural Sheet Metal Manual." Anchor units of work securely in place by methods indicated, providing for thermal expansion of metal units; conceal 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 weatherproof.
- B. Install reglets to receive counterflashing in manner and by methods recommended by SMACNA, and as detailed.
- C. Install counterflashing in reglets, either by snap-in seal arrangement or by welding in place for anchorage and filling reglet with mastic or elastomeric sealant, as indicated and depending on degree of sealant exposure.

3.2 CLEANING AND PROTECTION

- A. Clean exposed metal surfaces, removing substances that might cause corrosion of metal or deterioration of finishes.
- B. Clean and neutralize flux materials. Clean off excess solder and sealants.
- C. Remove temporary protective coverings and strippable films as roof specialties are installed. On completion of installation, clean finished surfaces including removing unused fasteners, metal filings, pop rivet stems, and pieces of flashing. Maintain roof specialties in a clean condition during construction.
- D. Replace roof specialties that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION

## SECTION 07 7129 - MANUFACTURED ROOF EXPANSION JOINTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Flanged bellows-type roof expansion joints.
- B. Related Requirements:
  - 1. Retain subparagraphs below to cross-reference requirements Contractor might expect to find in this Section 06 1000 "Rough Carpentry" for wooden curbs or cants for mounting roof expansion joints.
  - 2. Section 07 7200 "Roof Accessories" for manufactured and prefabricated metal roof curbs.

#### 1.3 PREINSTALLATION MEETINGS

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

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For roof expansion joints.
  - 1. Include plans, elevations, sections, and attachment details.
  - 2. Include details of splices, intersections, transitions, fittings, method of field assembly, and location and size of each field splice.
  - 3. Provide isometric drawings of intersections, terminations, changes in joint direction or planes, and transition to other expansion joint systems depicting how components interconnect with each other and adjacent construction to allow movement and achieve waterproof continuity.
- C. Samples: For each exposed product and for each color specified, 6 inches in size.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Test Reports: For each fire-barrier provided as part of a roof-expansion-joint assembly, for tests performed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

## 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: Installer of roofing membrane.

## 1.7 WARRANTY

- A. Special Warranty: Manufacturer and Installer agree to repair or replace roof expansion joints and components that leak, deteriorate beyond normal weathering, or otherwise fail in materials or workmanship within specified warranty period.
  - 1. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace roof expansion joints that show evidence of deterioration of factory-applied finishes within specified warranty period.
  - 1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
    - a. Color fading more than five 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: 10 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint seals, failure of connections, and other detrimental effects.
  - 1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.
- B. Fire-Resistance Rating: Comply with ASTM E 1966 or UL 2079; testing by a qualified testing agency to resist the spread of fire and to accommodate building thermal[ **and seismic**] movements without impairing its ability to resist the passage of fire and hot gases. Identify products with appropriate markings of applicable testing agency.
  - 1. Rating: As indicated on CP.\* Sheets.
  - 2. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

## 2.2 FLANGED BELLOWS-TYPE ROOF EXPANSION JOINTS

- A. Flanged Bellows-Type Roof Expansion Joint: Factory-fabricated, continuous, waterproof, joint cover consisting of exposed membrane bellows laminated to flexible, closed-cell support foam, and secured along each edge to 3- to 4-inch- wide metal flange.
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. Balco, Inc.
    - b. C/S Group.
    - c. InPro Corporation (IPC).
    - d. Johns Manville; a Berkshire Hathaway company.
  2. Source Limitations: Obtain flanged bellows-type roof expansion joints approved by roofing manufacturer and that are part of roofing membrane warranty.
  3. Joint Movement Capability: Plus and minus 50 percent of joint size.
  4. Bellows: EPDM flexible membrane, nominal 60 mils thick.
  5. Flanges: Galvanized steel, 0.022 inch thick.
  6. Configuration: Angle formed to fit curbs as indicated on Drawings.
  7. Corner, Intersection, and Transition Units: Provide factory-fabricated units for corner and joint intersections and horizontal and vertical transitions including those to other building expansion joints.
  8. Fire Barrier: Manufacturer's standard fire barrier for fire-resistance-rated expansion joint system.
- B. Materials:
1. Galvanized-Steel Sheet: ASTM A 653/A 653M, hot-dip zinc-coating designation G90.
  2. EPDM Membrane: ASTM D 4637/D 4637M, type standard with manufacturer for application.

## 2.3 MISCELLANEOUS MATERIALS

- A. Adhesives: As recommended by roof-expansion-joint manufacturer.
- B. Fasteners: Manufacturer's recommended fasteners, suitable for application and designed to withstand design loads.
1. Exposed Fasteners: Gasketed. Use screws with hex washer heads matching color of material being fastened.
- C. Mineral-Fiber Blanket: ASTM C 665.
- D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine joint openings, substrates, and expansion-control joint systems that interface with roof expansion joints, for suitable conditions where roof expansion joints will be installed.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. General: Comply with manufacturer's written instructions for handling and installing roof expansion joints.
  - 1. Anchor roof expansion joints securely in place, with provisions for required movement. Use fasteners, protective coatings, sealants, and miscellaneous items as required to complete roof expansion joints.
  - 2. Install roof expansion joints true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.
  - 3. Provide for linear thermal expansion of roof expansion joint materials.
  - 4. Provide uniform profile of roof expansion joint throughout its length; do not stretch or squeeze membranes.
  - 5. Provide uniform, neat seams.
  - 6. Install roof expansion joints to fit substrates and to result in watertight performance.
- B. Directional Changes: Install factory-fabricated units at directional changes to provide continuous, uninterrupted, and watertight joints.
- C. Transitions to Other Expansion-Control Joint Assemblies: Coordinate installation of roof expansion joints with other exterior expansion-control joint assemblies specified in Section 079513.16 "Exterior Expansion Joint Cover Assemblies" to result in watertight performance. Install factory-fabricated units at transitions between roof expansion joints and exterior expansion-control joint systems.
- D. Splices: Splice roof expansion joints to provide continuous, uninterrupted, and waterproof joints.
- E. Fire Barrier: Install fire barrier as required by manufacturer to provide continuous, uninterrupted fire resistance throughout length of roof expansion joint, including transitions and end joints.
- F. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

END OF SECTION

## SECTION 07 7200 - ROOF ACCESSORIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Roof curbs and equipment supports.
  - 2. Roof hatches.
    - a. Safety railing system.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, materials, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings for Prefabricated Curbs: Show fabrication and installation details. Indicate dimensions, weights, loadings, required clearances, method of field assembly, and components. Include plans, elevations, sections, details, and attachments to other Work.

#### 1.4 QUALITY ASSURANCE

- A. Standards: Comply with the following:
  - 1. SMACNA's "Architectural Sheet Metal Manual" details for fabrication of units, including flanges and cap flashing to coordinate with type of roofing indicated.
  - 2. NRCA's "Roofing and Waterproofing Manual" details for installing units.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Roof Curbs and Equipment Supports:
    - \* a. Roof Products, Inc. (RPI)
    - b. Roof Products & Systems Corp. (RPS)
    - c. ThyCurb, Inc.
  - 2. Roof Hatches and Accessories:
    - a. Bilco Company.
    - b. Dur-Red Products, Inc.
    - \* c. J L Industries.
    - d. Milcor, Inc.

- e. O'Keeffe's Inc.
- f. Babcock-Davis Hatchways, Inc.

(\* indicates Basis-of-Specification product.)

## 2.2 MATERIALS, GENERAL

- A. Aluminum Sheet: ASTM B 209 for alclad alloy 3005H25 or alloy and temper required to suit forming operations, with mill finish, unless otherwise indicated.
- B. Extruded Aluminum: ASTM B 221 alloy 6063-T52 or alloy and temper required to suit structural and finish requirements, with mill finish, unless otherwise indicated.
- C. Galvanized Steel Sheet: ASTM A 653 with G90 coating designation; commercial quality, unless otherwise indicated.
  - 1. Structural Quality: Grade 40, where indicated or as required for strength.
- D. Insulation: Manufacturer's standard rigid or semirigid glass-fiber board of thickness indicated.
- E. Wood Nailers: Softwood lumber, pressure treated with waterborne preservatives for aboveground use, complying with AWPA C2; not less than 1-1/2 inches thick.
- F. Fasteners: Same metal as metals being fastened, or nonmagnetic stainless steel or other noncorrosive metal as recommended by manufacturer. Match finish of exposed fasteners with finish of material being fastened.
  - 1. Where removing exterior exposed fasteners affords access to building, provide nonremovable fastener heads.
- G. Gaskets: Manufacturer's standard tubular or fingered design of neoprene, EPDM, or PVC; or flat design of foam rubber, sponge neoprene, or cork.
- H. Bituminous Coating: SSPC-Paint 12, solvent-type bituminous mastic, nominally free of sulfur and containing no asbestos fibers, compounded for 15-mil dry film thickness per coating.
- I. Mastic Sealant: Polyisobutylene; nonhardening, nonskinning, nondrying, nonmigrating sealant.
- J. Elastomeric Sealant: Generic type recommended by unit manufacturer that is compatible with joint surfaces; ASTM C 920, Type S, Grade NS, Class 25, and Uses NT, G, A, and, as applicable to joint substrates indicated, O.
- K. Roofing Cement: ASTM D 4586, nonasbestos, fibrated asphalt cement designed for trowel application or other adhesive compatible with roofing system.

## 2.3 ROOF CURBS

- A. General: Provide roof curbs capable of supporting superimposed live and dead loads, including equipment loads and other construction to be supported on roof curbs. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.

- B. Fabrication: Unless otherwise indicated or required for strength, fabricate units from minimum 0.0747-inch-thick (14 gage), structural-quality, hot-dip galvanized steel sheet; factory primed and prepared for painting with corner joints mitered and fully welded.
1. Shop prime welded connections with zinc-rich paint complying with SSPC-Paint 20.
  2. Structurally reinforce curb sections 24 inches o.c. at bulkheads.
  3. Provide preservative-treated wood nailers (nominal 2" x 2") at tops of curbs and formed flange (3-inch width) at perimeter bottom for mounting to roof. Mechanically fasten wood nailers at 12 inches o.c. to exterior face of curb.
  4. On ribbed or fluted metal roofs, form flange at perimeter bottom to conform to roof profile.
  5. Provide manufacturer's standard rigid or semirigid insulation with curb liner where indicated.
  6. Fabricate units to typical height of 8 inches, as measured from top of roof membrane to top of curb, unless otherwise indicated.
  7. Sloping Roofs: Where slope of roof deck equals or exceeds 1/4 inch per foot, fabricate curb units with height tapered to match slope to level tops of units.
  8. Provide the following curb models for this Project (Roof Products, Inc. designations):
    - a. Typical equipment curb: RPC
    - b. Platform curbs: RPPF
    - c. Vertical pipe curbs: RPVP with metal cap portal system and EPDM pipe flashing.
    - d. Custom pipe roller supports: RPPS.
    - e. Equipment supports: RPES.

## 2.4 ROOF HATCHES

- A. General: Fabricate units to withstand 40-lbf/sq. ft. external and 20-lbf/sq. ft. internal loading pressure. Frame with minimum 12-inch-high, integral-curb, double-wall construction with 1-inch insulation, formed cants and cap flashing (roofing counterflashing), with welded mechanical corner joints. Provide double-wall cover (lid) construction with 1-inch-thick insulation core. Provide gasketing and equip with corrosion-resistant or hot-dip galvanized hardware including pintle hinges, hold-open devices, interior padlock hasps, and both interior and exterior latch handles. Provide J L Industries Model LP-5 galvanized safety post at each roof hatch.
1. This specification is based on J L Industries Model RHG-2-STH roof scuttle to establish the performance and quality desired for this Project. Metal thickness:
    - a. Cover and curb: 14 gage.
    - b. Cover liner: 22 gage.
- B. Type: Single-leaf personnel access.
1. For Ladder Access: 30 by 54 inches.
- C. Material: Galvanized steel sheets.
1. Finish: Prime painted.
- D. Accessories:
1. Safety Railing System: Manufacturer's standard complete system including rails, clamps, fasteners, safety barrier at railing opening, and all accessories required for a complete installation.
    - a. Performance: Comply with requirements of OSHA 29 CFR 1910.232 and CFR 29-1910.27.

- b. Height: 42 inches above finished roof
  - c. Pipe or Tube: 1-1/4-inch ID galvanized pipe or 1-5/8-inch OD galvanized tube.
  - d. Flat Bar: 2-inch-high x 3/8-inch-thick galvanized steel.
  - e. Chain Passway Enclosure: Galvanized proof coil chain with quick link on fixed end.
  - OR -
  - e. Self-Latching Gate: Fabricated of same materials and rail spacing as safety railing system. Provide manufacturer's standard hinges and self-latching mechanism.
  - f. Pipe Ends and Tops: Covered or plugged with weather-resistant material.
  - g. Provide weep holes or another means to drain entrapped water in hollow sections of handrail and railing members that are exposed to exterior or to moisture from condensation or other sources.
  - h. Fabricate joints that will be exposed to weather in a watertight manner.
  - i. Close exposed ends of handrail and railing members with prefabricated end fittings.
  - j. Fasteners: Manufacturer's standard.
2. Provide product similar to JL Industries No. STH-1 for 30 x 36-inch hatch.
- E. Sloping Roofs: Where slope or roof deck exceeds 1/4 inch per foot, fabricate hatch curbs with height tapered to match slope to level tops of units.

## 2.5 ALUMINUM FINISHES

- A. Finish designations prefixed by AA comply with the system established by the Aluminum Association for designating aluminum finishes.
- B. Class I, Clear Anodic Finish: AA-M12C22A41 (Mechanical Finish: nonspecular as fabricated; Chemical Finish: etched, medium matte; Anodic Coating: Architectural Class I, clear coating 0.018 mm or thicker) complying with AAMA 607.1.

## 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. 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 GALVANIZED STEEL SHEET FINISHES

- A. Surface Preparation: Clean surfaces with nonpetroleum solvent so surfaces are free of oil and other contaminants. After cleaning, apply a conversion coating suited to the organic coating to be applied over it. Clean welds, mechanical connections, and abraded areas, and apply galvanizing repair paint specified below to comply with ASTM A 780.
  - 1. Galvanizing Repair Paint: High zinc-dust-content paint for regalvanizing welds in steel, complying with SSPC-Paint 20.
- B. Factory Priming for Field-Painted Finish: Where field painting after installation is indicated, apply the air-dried primer specified below immediately after cleaning and pretreating.
  - 1. Shop Primer: Exterior galvanized metal primer per Division 09 Section "High-Performance Coatings."

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Comply with manufacturer's written instructions. Coordinate installation of roof accessories with installation of roof deck, roof insulation, flashing, roofing membranes, penetrations, equipment, and other construction involving roof accessories to ensure that each element of the Work performs properly and that combined elements are waterproof and weathertight. Anchor roof accessories securely to supporting structural substrates so they are capable of withstanding lateral and thermal stresses, and inward and outward loading pressures.
- B. Install roof accessory items according to construction details of NRCA's "Roofing and Waterproofing Manual," unless otherwise indicated,
- C. Separation: Separate metal from incompatible metal or corrosive substrates, including wood, by coating concealed surfaces, at locations of contact, with bituminous coating or providing other permanent separation.
- D. Flange Seals: Unless otherwise indicated, set flanges of accessory units in a thick bed of roofing cement to form a seal.
- E. Cap Flashing: Where required as component of accessory, install cap flashing to provide waterproof overlap with roofing or roof flashing (as counterflashing). Seal overlap with thick bead of mastic sealant.
- F. Roof Curb Installation:
  - 1. Set roof curb so top surface of roof curb is level.
- G. Equipment Support Installation:
  - 1. Set equipment support so top surface of equipment support is level.
- H. Roof Hatch Installation:
  - 1. Check roof hatch for proper operation. Adjust operating mechanism as required. Clean and lubricate joints and hardware.

2. Attach safety railing system to roof hatch curb. Do not penetrate roof membrane during installation of safety railing system.
  3. Attach ladder safety post according to manufacturer's written instructions.
- I. Operational Units: Test-operate units with operable components. Clean and lubricate joints and hardware. Adjust for proper operation.
- 3.2 CLEANING AND PROTECTION
- A. Clean exposed surfaces according to manufacturer's written instructions. Touch up damaged metal coatings.

END OF SECTION

## SECTION 07 8100 - 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. Section includes sprayed fire-resistive materials.
- B. Related Requirements:
  - 1. Section 07 8123 "Intumescent Fireproofing" for mastic and intumescent fire-resistive coatings.

#### 1.3 DEFINITIONS

- A. SFRM: Sprayed fire-resistive materials.

#### 1.4 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review products, design ratings, restrained and unrestrained conditions, densities, thicknesses, bond strengths, and other performance requirements.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Framing plans or schedules, or both, indicating the following:
  - 1. Extent of fireproofing for each construction and fire-resistance rating.
  - 2. Applicable fire-resistance design designations of a qualified testing and inspecting agency acceptable to authorities having jurisdiction.
  - 3. Minimum fireproofing thicknesses needed to achieve required fire-resistance rating of each structural component and assembly.
  - 4. Treatment of fireproofing after application.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

- B. Product Certificates: For each type of fireproofing.
- C. Evaluation Reports: For fireproofing, from ICC-ES.
- D. Preconstruction Test Reports: For fireproofing.
- E. Field quality-control reports.

#### 1.7 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.

#### 1.8 PRECONSTRUCTION TESTING

- A. Preconstruction Adhesion and Compatibility Testing: Test for compliance with requirements for specified performance and test methods.
  - 1. Bond Strength: Test for cohesive and adhesive strength according to ASTM E 736. Provide bond strength indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
  - 2. Density: Test for density according to ASTM E 605. Provide density indicated in referenced fire-resistance design, but not less than minimum specified in Part 2.
  - 3. Verify that manufacturer, through its own laboratory testing or field experience, attests that primers or coatings are compatible with fireproofing.
  - 4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
  - 5. For materials failing tests, obtain applied-fireproofing manufacturer's written instructions for corrective measures including the use of specially formulated bonding agents or primers.

#### 1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not apply fireproofing when ambient or substrate temperature is 44 deg F 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 fireproofing, providing complete air exchanges according to manufacturer's written instructions. Use natural means or, if they are inadequate, forced-air circulation until fireproofing dries thoroughly.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Assemblies: Provide fireproofing, including auxiliary materials, according to requirements of each fire-resistance design and manufacturer's written instructions.
- B. Source Limitations: Obtain fireproofing from single source.
- C. Fire-Resistance Design: Indicated on Drawings, tested according to ASTM E 119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Steel members are to be considered unrestrained unless specifically noted otherwise.
- D. Asbestos: Provide products containing no detectable asbestos.

### 2.2 SPRAYED FIRE-RESISTIVE MATERIALS

- A. Sprayed Fire-Resistive Material: Manufacturer's standard, factory-mixed, lightweight, dry formulation, complying with indicated fire-resistance design, and mixed with water at Project site to form a slurry or mortar before conveyance and application or conveyed in a dry state and mixed with atomized water at place of application, as is required by manufacturer to meet tested assembly criteria for rating 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. Carboline Company; a subsidiary of RPM International.
    - b. Grace Construction Products; W.R. Grace & Co. -- Conn.
    - c. Isolatek International.
    - d. Pyrok, Inc.
  - 2. Bond Strength: Minimum 150-lbf/sq. ft. cohesive and adhesive strength based on field testing according to ASTM E 736.
  - 3. Density: Not less than density specified in the approved fire-resistance design, according to ASTM E 605.
  - 4. Thickness: As required for fire-resistance design indicated, measured according to requirements of fire-resistance design or ASTM E 605, whichever is thicker.
  - 5. Combustion Characteristics: ASTM E 136.
  - 6. 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: 10 or less.
    - b. Smoke-Developed Index: 10 or less.
  - 7. Corrosion Resistance: No evidence of corrosion according to ASTM E 937.
  - 8. Deflection: No cracking, spalling, or delamination according to ASTM E 759.
  - 9. Effect of Impact on Bonding: No cracking, spalling, or delamination according to ASTM E 760.

## 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: Where required by fireproofing manufacturer, provide primers approved by fireproofing manufacturer and complying with one or both of the following requirements:
  - 1. Primer and substrate are identical to those tested in required fire-resistance design by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
  - 2. Primer's bond strength in required fire-resistance design complies with specified bond strength for fireproofing and with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction, based on a series of bond tests according to ASTM E 736.
- C. Bonding Agent: Product approved by fireproofing manufacturer and complying with requirements in UL's "Fire Resistance Directory" or in the listings of another qualified testing agency acceptable to authorities having jurisdiction.
- D. Metal Lath: Expanded metal lath fabricated from material of weight, configuration, and finish required, according to fire-resistance designs indicated and fireproofing manufacturer's written instructions. Include clips, lathing accessories, corner beads, and other anchorage devices required to attach lath to substrates and to receive fireproofing.
- E. Reinforcing Fabric: Glass- or carbon-fiber fabric of type, weight, and form required to comply with fire-resistance designs indicated; approved and provided by fireproofing manufacturer.
- F. Reinforcing Mesh: Metallic mesh reinforcement of type, weight, and form required to comply with fire-resistance design indicated; approved and provided by fireproofing manufacturer. Include pins and attachment.
- G. 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 EXAMINATION

- 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.
  - 1. Verify that substrates are free of dirt, oil, grease, release agents, rolling compounds, mill scale, loose scale, incompatible primers, paints, and encapsulants, or other foreign substances capable of impairing bond of fireproofing with substrates under conditions of normal use or fire exposure.
  - 2. Verify that objects penetrating fireproofing, including clips, hangers, support sleeves, and similar items, are securely attached to substrates.

3. Verify that substrates receiving fireproofing are not obstructed by ducts, piping, equipment, or other suspended construction that will interfere with fireproofing application.
  - B. Verify that concrete work on steel deck is complete before beginning fireproofing work.
  - C. Verify that roof construction, installation of rooftop HVAC equipment, and other related work are complete before beginning fireproofing work.
  - D. Conduct tests according to fireproofing manufacturer's written instructions to verify that substrates are free of substances capable of interfering with bond.
  - E. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
  - F. 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 fireproofing materials during application.
- B. Clean substrates of substances that could impair bond of fireproofing.
- C. Where required by fireproofing manufacturer, 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.
- D. 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. Remove minor projections and fill voids that would telegraph through fire-resistive products after application.

### 3.3 APPLICATION

- A. Construct fireproofing assemblies that are identical to fire-resistance design indicated and products as specified, tested, and substantiated by test reports; for thickness, primers, sealers, topcoats, finishing, and other materials and procedures affecting fireproofing work.
- B. Comply with fireproofing manufacturer's written instructions for mixing materials, application procedures, and types of equipment used to mix, convey, and apply fireproofing; as applicable to particular conditions of installation and as required to achieve fire-resistance ratings indicated.
- C. Coordinate application of fireproofing with other construction to minimize need to cut or remove fireproofing.
  1. Do not begin applying fireproofing until clips, hangers, supports, sleeves, and other items penetrating fireproofing are in place.

2. Defer installing ducts, piping, and other items that would interfere with applying fireproofing until application of fireproofing is completed.
- D. Metal Decks:
1. Do not apply fireproofing to underside of metal deck substrates until concrete topping, if any, is completed.
  2. Do not apply fireproofing to underside of metal roof deck until roofing is completed; prohibit roof traffic during application and drying of fireproofing.
- E. Install auxiliary materials as required, as detailed, and according to fire-resistance design and fireproofing manufacturer's written instructions for conditions of exposure and intended use. For auxiliary materials, use attachment and anchorage devices of type recommended in writing by fireproofing manufacturer.
- F. Spray apply fireproofing to maximum extent possible. After the spraying operation in each area, complete the coverage by trowel application or other placement method recommended in writing by fireproofing manufacturer.
- G. Extend fireproofing in full thickness over entire area of each substrate to be protected.
- H. Install body of fireproofing in a single course unless otherwise recommended in writing by fireproofing manufacturer.
- I. Provide a uniform finish complying with description indicated for each type of fireproofing material and matching finish approved for required mockups.
- J. Cure fireproofing according to fireproofing manufacturer's written instructions.
- K. Do not install enclosing or concealing construction until after fireproofing has been applied, inspected, and tested and corrections have been made to deficient applications.
- L. 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.
  2. Spray-Textured Finish: Finish left as spray applied with no further treatment.
  3. Rolled, Spray-Textured Finish: Even finish produced by rolling spray-applied finish with a damp paint roller to remove drippings and excessive roughness.
  4. Skip-Troweled Finish: Even leveled surface produced by troweling spray-applied finish to smooth out the texture and neaten edges.
  5. Skip-Troweled Finish with Corner Beads: Even, leveled surface produced by troweling spray-applied finish to smooth out the texture, eliminate surface markings, and square off edges.

### 3.4 FIELD QUALITY CONTROL

- A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
1. Test and inspect as required by the IBC, Subsection 1705.13, "Sprayed Fire-Resistant Materials."

- B. Perform the tests and inspections of completed Work in successive stages. Do not proceed with application of fireproofing for the next area until test results for previously completed applications of fireproofing show compliance with requirements. Tested values must equal or exceed values as specified and as indicated and required for approved fire-resistance design.
- C. 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.
- D. Prepare test and inspection reports.

### 3.5 CLEANING, PROTECTING, 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. Protect fireproofing, according to advice of manufacturer and Installer, from damage resulting from construction operations or other causes, so fireproofing is without damage or deterioration at time of Substantial Completion.
- C. As installation of other construction proceeds, inspect fireproofing and repair damaged areas and fireproofing removed due to work of other trades.
- D. Repair fireproofing damaged by other work before concealing it with other construction.
- E. Repair fireproofing by reapplying it using same method as original installation or using manufacturer's recommended trowel-applied product.

END OF SECTION



## SECTION 07 8400 - FIRESTOPPING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Refer to Division 07 Section "Thermal Insulation" for fire safing insulation.

#### 1.2 SUMMARY

- A. Section includes:
  - 1. Through-penetration firestopping in fire-rated construction.
  - 2. Construction-gap firestopping at connections of the same or different materials in fire-rated construction.
  - 3. Construction-gap firestopping occurring within fire-rated wall, floor or floor-ceiling assemblies.
  - 4. Construction-gap firestopping occurring at the top of fire-rated walls.

#### 1.3 REFERENCES

- A. Underwriters Laboratories
  - 1. U.L. Fire Resistance Directory
    - a. Through-Penetration Firestop Devices (XHCR)
    - b. Fire Resistance Ratings (BXUV)
    - c. Through-Penetration Firestop Systems (XHEZ)
    - d. Fill, Void, or Cavity Material (XHHW)
    - e. Forming Material (XHKU)
  - 2. U.L. 1479 Test Method for Fire Tests of Through-Penetration Firestops, including optional air leak test.
  - 3. U.L. 2079 Test for Fire Resistance of Building Joint Systems.
  - 4. U.L. Component Listing Test Criteria
  - 5. Warnock Hersey
- B. American Society for Testing and Materials Standards:
  - 1. ASTM E 814-88: Standard Test Method for Fire Tests of Through-Penetration Firestops.
  - 2. ASTM E 1399-91: Standard Test Method for Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems.

#### 1.4 DEFINITIONS

- A. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.
- B. Barriers: Time rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and structural floors.

- C. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit spread of heat, fire, gasses and smoke.
- D. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is not obtained.
- E. Construction gaps: Gaps between adjacent sections of walls, exterior walls, at wall tops between top of wall and ceiling, and structural floors or roof decks; and gaps between adjacent sections of structural floors.
- F. System: Specific products and applications, classified and numbered by Underwriters Laboratories, Inc. to close specific barrier penetrations.
- G. Sleeve: Metal fabrication or pipe section extending through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other Sections and may or may not be required.

#### 1.5 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide firestopping systems that are produced and installed to resist the spread of fire, according to requirements indicated, and the passage of smoke and other gases.
- B. F-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with F ratings indicated, as determined per ASTM E 814, but not less than that equaling or exceeding the fire-resistance rating of the constructions penetrated.
- C. T-Rated Through-Penetration Firestop Systems: Provide through-penetration firestop systems with T ratings, in addition to F ratings, as determined per ASTM E 814, where indicated and where systems protect penetrating items exposed to contact with adjacent materials in occupiable floor areas.
- D. Fire-Resistive Joint Sealants: Provide joint sealants with fire-resistance ratings indicated, as determined per ASTM E 119, but not less than that equaling or exceeding the fire-resistance rating of the construction in which the joint occurs.
- E. For firestopping exposed to view, traffic, moisture, and physical damage, provide products that do not deteriorate when exposed to these conditions.
- F. For firestopping exposed to view, provide products with flame-spread values of less than 25 and smoke-developed values of less than 450, as determined per ASTM E 84.

#### 1.6 ACTION SUBMITTALS

- A. Product Data: Submit only for conditions different from or not indicated in the Contract Documents. Product data shall include tested assemblies as required for completion of Project.

## 1.7 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide firestopping that complies with the following requirements and those specified under the "System Performance Requirements" article:
1. Firestopping tests are performed by the City of Kingman (Authority Having Jurisdiction/AHJ).
  2. Through-penetration firestop systems are identical to those tested per ASTM E 814 under conditions where positive furnace pressure differential of at least 0.01 inch of water is maintained at a distance of 0.78 inch below the fill materials surrounding the penetrating items in the test assembly.
  3. Fire-resistive joint sealant systems are identical to those tested for fire-response characteristics per ASTM E 119 under conditions where the positive furnace pressure differential is at least 0.01 inch of water, as measured 0.78 inch from the face exposed to furnace fire. Provide systems complying with the following requirements:
    - a. Fire-Resistance Ratings of Joint Sealants: As indicated by reference to design designations listed by UL in their "Fire Resistance Directory" or by another qualified testing and inspecting agency.
    - b. Joint sealants, including backing materials, bear classification marking of qualified testing and inspection agency.
- B. Installer Qualifications: Engage an experienced Installer who is certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary experience, staff, and training to install manufacturer's products per specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an Installer engaged by the Contractor does not in itself confer qualification on the buyer.
- C. Single-Source Responsibility: Obtain through-penetration firestop systems for each kind of penetration and construction condition indicated from a single manufacturer.
- D. Provide firestopping products containing no detectable asbestos as determined by the method specified in 40 CFR Part 763, Subpart F, Appendix A, Section 1, "Polarized Light Microscopy."
- E. Coordinating Work: Coordinate construction of openings and penetrating items to ensure that designated through-penetration firestop systems are installed per specified requirements.
- F. Authority having jurisdiction will check installed firestopping systems for compliance with requirements.

## 1.8 DELIVERY, STORAGE, AND HANDLING

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

## 1.9 PROJECT CONDITIONS

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

## 1.10 COORDINATION

- A. Notify authority having jurisdiction at least 1 week in advance of firestopping installations; confirm dates and times on days preceding each series of installations.

## PART 2 - PRODUCTS

### 2.1 FIRESTOPPING, GENERAL

- A. Compatibility: Provide firestopping composed of components that are compatible with each other, the substrates forming openings, and the items, if any, penetrating the firestopping under conditions of service and application, as demonstrated by firestopping manufacturer based on testing and field experience.
- B. Accessories: Provide components for each firestopping system that are needed to install fill materials and to comply with "System Performance Requirements" article in Part 1. Use only components specified by the firestopping manufacturer and approved by the qualified testing and inspecting agency for the designated fire-resistance-rated systems.
- C. Applications: Provide firestopping systems composed of materials specified in this Section that comply with system performance and other requirements.

### 2.2 FILL MATERIALS FOR THROUGH-PENETRATION FIRESTOP SYSTEMS

- A. Products: Systems or devices listed in the U.L. Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that the system or device conforms to the construction type, penetrant type, annular space requirements and fire rating involved in each separate instance, and that the system be symmetrical for wall applications. Mortar systems must be Warnock Hersey approved.
  - 1. Additional requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the U.L. system or device, and designed to perform this function.
  - 2. Acceptable manufacturers and products: Those listed in the U.L. Fire Resistance Directory for the U.L. System involved, or Mortar systems approved by Warnock Hersey, and as shown on Drawings.

### 2.3 FIRE-RESISTIVE ELASTOMERIC JOINT SEALANTS

- A. Elastomeric Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that complies with ASTM C 920 requirements, including those referenced for Type, Grade, Class, and Uses, and requirements specified in this Section applicable to fire-resistive joint sealants.
- B. Sealant Colors: Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated. Where exposed to view, match color of adjacent surface.
- C. Single-Component, Neutral-Curing Silicone Sealant: Type S; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, G, A, and (as applicable to joint substrates indicated) O.
- D. Multicomponent, Nonsag, Urethane Sealant: Type M; Grade NS; Class 25; exposure-related Use NT, and joint-substrate-related Uses M, A, and (as applicable to joint substrates indicated) O.
- E. Single-Component, Nonsag, Urethane Sealant: Type S; Grade NS; Class 25; and Uses NT, M, A, and (as applicable to joint substrates indicated) O.
- F. Acceptable Manufacturers and Products: Those listed in the U.L. Fire Resistance Directory for the U.L. System involved and as shown on Drawings.

### 2.4 ACCESSORIES

- A. Fill, Void or Cavity Materials: As classified under Category XHHW in the U.L. Fire Resistance Directory.
- B. Forming Materials: As classified under Category XHKU in the U.L. Fire Resistance Directory.

### 2.5 MIXING

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

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of firestopping. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

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

### 3.3 INSTALLING THROUGH-PENETRATION FIRESTOPS

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

### 3.4 INSTALLING FIRE-RESISTIVE JOINT SEALANTS

- A. General: Comply with the "System Performance Requirements" article in Part 1, with ASTM C 1193, and with the sealant manufacturer's installation instructions and drawings pertaining to products and applications indicated.

- B. Install joint fillers to provide support of sealants during application and at position required to produce the cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability and develop fire-resistance rating required.
- C. Install sealants by proven techniques that result in sealants directly contacting and fully wetting joint substrates, completely filling recesses provided for each joint configuration, and providing uniform, cross-sectional shapes and depths relative to joint width that optimum sealant movement capability. Install sealants at the same time joint fillers are installed.
- D. Tool nonsag sealants immediately after sealant application and prior to the time skinning or curing begins. Form smooth, uniform beads of configuration indicated or required to produce fire-resistance rating, as well as to eliminate air pockets, and to ensure contact and adhesion of sealants with sides of joint. Remove excess sealant from surfaces adjacent to joint. Do not use tooling agents that discolor sealants or adjacent surfaces or are not approved by sealant manufacturer.

### 3.5 FIELD QUALITY CONTROL

- A. Authority having jurisdiction will examine completed firestopping to determine, in general, if it is being installed in compliance with requirements.
- B. Do not proceed to enclose firestopping with other construction until reports of examinations are issued.
- C. Where deficiencies are found, repair or replace firestopping so that it complies with requirements.

### 3.6 CLEANING

- A. Clean off excess fill materials and sealants adjacent to openings and joints as work progresses by methods and with cleaning materials approved by manufacturers of firestopping products and of products in which opening and joints occur.
- B. Protect firestopping during and after curing period from contact with contaminating substances or from damage resulting from construction operations or other causes so that they 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 firestopping immediately and install new materials to produce firestopping complying with specified requirements.

END OF SECTION



## SECTION 07 9200 - JOINT SEALANTS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SYSTEM PERFORMANCE REQUIREMENTS

- A. Provide elastomeric joint sealants that have been produced and installed to establish and to maintain watertight and airtight continuous seals without causing staining or deterioration of joint substrates.
- B. Provide joint sealants for interior applications that have been produced and installed to establish and maintain airtight continuous seals that are water resistant and cause no staining or deterioration of joint substrates.

#### 1.3 SUBMITTALS

- A. Color Samples: For initial selection purposes in form of manufacturer's standard bead samples, consisting of strips of actual products showing full range of colors available, for each product exposed to view.

#### 1.4 QUALITY CONTROL

- A. Sealants for Work of this Section shall be obtained from a single manufacturer for each different product required, to ensure that materials which come in contact with one another will be compatible. Installer shall supply a letter from the manufacturer certifying the compatibility of all sealants with one another, and with all construction materials with which they will come in contact on the Project.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in original unopened containers or bundles with labels indicating manufacturer, product name and designation, color, expiration period for use, pot life, curing time, and mixing instructions for multicomponent materials.
- B. Store and handle materials in compliance with manufacturer's recommendations to prevent their deterioration or damage due to moisture, high or low temperatures, contaminants, or other causes.

## 1.6 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with installation of joint sealants under the following conditions:
  - 1. When ambient and substrate temperature conditions are outside the limits permitted by joint sealant manufacturer.
  - 2. When joint substrates are wet.
- B. Joint Width Conditions: Do not proceed with installation of joint sealants where joint widths are less than allowed by joint sealant manufacturer for application indicated.
- C. Joint Substrate Conditions: Do not proceed with installation of joint sealants until contaminants capable of interfering with their adhesion are removed from joint substrates.

## 1.7 WARRANTY

- A. Provide a 3-year warranty, in writing and signed jointly by the installer and sealant manufacturer, agreeing to replace any or all joints failing within the warranty period at not cost to the Owner, labor and material inclusive.

## PART 2 - PRODUCTS

### 2.1 MATERIALS, GENERAL

- A. Compatibility: Provide joint sealants, joint fillers, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
- B. Colors: Provide color of exposed joint sealants to comply with the following:
  - 1. Provide selections made by Architect from manufacturer's full range of standard and custom colors for products of type indicated.

### 2.2 ELASTOMERIC JOINT SEALANTS

- A. Materials listed below are manufactured by Tremco, and establish the standard desired for this Project. Similar materials manufactured by the following are also acceptable:
  - 1. Dow Corning.
  - 2. Sonneborn
  - 3. Sika Corp.
  - 4. Pecora Corp.
  - 5. Vulkem.
  - 6. General Electric Company.
- B. Polyurethane sealants, multi-component. These sealants shall comply with ASTM C 920:
  - 1. Sealant #1: Type M, Grade NS, Class 25, Use I (Class 2), NT, M, A and O; capable of 50% extension and compression movement. (Dymeric 240 FC)
  - 2. Sealant #2: Type M, Grade P, Class 25, Use T, M, and O. (THC - 900/901)

- C. Silicone Sealants, one-part, complying with ASTM C 920:
  - 1. Sealant #3: Type S, Grade NS, Class 50, Use NT, M, G, A and O; capable of 50% extension and compression movement. (Spectrem 2 or Spectrem 3) (Note: Use Spectrem 4 if tintable sealant is desired).
  - 2. Sealant #4: Type S, Grade NS, Class 25, Use NT, M, G, A and O; capable of 100% extension and 50% compression movement. (Spectrem 1)
  - 3. Sealant #5: Mildew-resistant, formulated with fungicide, Type S, Grade NS, Use NT, G, A and O. (Tremsil 200) Color: White.
- D. Sealant #6: Acrylic latex sealant, one-part, complying with ASTM C 834. (Tremflex 834 Caulk)
- E. Sealant #7: Acoustical sealant. (Tremco Acoustical Sealant)

### 2.3 JOINT SEALANT BACKING

- A. General: Provide sealant backings of material and type 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. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonwaxing, nonextruding strips of flexible plastic foam of material indicated below and of size, shape, and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
  - 1. Closed-cell polyethylene foam, nonabsorbent to liquid water and gas, nonoutgassing in unruptured state.
    - a. Horizontal Application: ITP "HBR" or approved equal.
    - b. Vertical Application: ITP closed-cell or soft-type backer rod or approved equal.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape as recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. 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 in any way joint substrates and adjacent nonporous surfaces, and formulated to promote optimum adhesion of sealants with 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. Do not proceed with installation of joint sealants until unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with recommendations of joint sealant manufacturer 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 concrete, masonry, unglazed surfaces of ceramic tile, and similar 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 from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air.
  - 3. Remove laitance and form release agents from concrete.
  - 4. Clean metal, glass, porcelain enamel, glazed surfaces of ceramic tile, and other nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
- B. Joint Priming: Prime joint substrates where indicated or where recommended by joint sealant manufacturer based on preconstruction joint sealant-substrate tests or prior experience. Apply primer to comply with joint sealant manufacturer's recommendations. 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 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, except where more stringent requirements apply.
- B. Sealant Installation Standard: Comply with recommendations of ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.
- C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.
  - 1. Do not leave gaps between ends of sealant backings.
  - 2. Do not stretch, twist, puncture, or tear sealant backings.
  - 3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

- D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.
- E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
  - 1. Place sealants so they directly contact and fully wet joint substrates.
  - 2. Completely fill recesses in each joint configuration.
  - 3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.
- F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.
  - 1. Remove excess sealant from surfaces adjacent to joints.
  - 2. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
  - 3. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
  - 4. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
  - 5. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.
    - 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 sealants or sealant smears adjacent to joints as work progresses by methods and with cleaning materials approved 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 or from damage resulting from construction operations or other causes so that they 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 that installations with repaired areas are indistinguishable from original work.

### 3.6 SCHEDULES

- A. Exterior Locations:
  - 1. Joints which are bordered by glass: Sealant #3. (Spectrem 2)
  - 2. Joints which are bordered by plastic: Sealant #4.

3. Horizontal joints in sidewalks, decks, concrete floors, and driveways: Sealant #2.
    - a. At walk expansion joints.
    - b. Where walks abut structural slabs or stoops.
    - c. Where walks abut exterior wall of buildings.
    - d. Where exposed interior concrete slabs abut vertical surfaces.
    - e. Where sealant is shown on the Drawings for concrete slabs.
  4. All other exterior joints: Sealant #1.
    - a. Around perimeters of frames where door, window and louver frames abut concrete, masonry or other building materials (interior and exterior).
    - b. Expansion and control joints in masonry walls (interior and exterior).
    - c. Masonry at dissimilar material or at dissimilar masonry.
    - d. Sills and thresholds.
    - e. At miscellaneous locations where sealant is shown on Drawings.
- B. Interior Locations:
1. Expansion and control joints: Sealant #1.
  2. Horizontal joints in concrete floors: Sealant #2.
  3. Interior wet area and around plumbing fixtures: Sealant #5.
  4. Interior static dry joints as required to dress appearance: Sealant #6.
  5. Where required for sound control: Sealant #6 or #7.
- C. General:
1. Joints in construction between interior and exterior spaces and other designated or required locations to provide effective barrier against passage of elements: Sealant #1.
  2. Specialty perimeters where required for appearance or weather tightness: Sealants #1, #3 or #4.

END OF SECTION

## SECTION 07 9500 - EXPANSION JOINT COVER ASSEMBLIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes interior and exterior expansion joint cover assemblies.
- B. Related Requirements:
  - 1. Section 07 7129 "Manufactured Roof Expansion Joints" for factory-fabricated roof expansion joint cover assemblies.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for expansion joint cover assemblies.
- B. Shop Drawings: For each expansion joint cover assembly.
  - 1. Include plans, elevations, sections, details, splices, block-out requirement, attachments to other work, and line diagrams showing entire route of each expansion joint.
  - 2. Where expansion joint cover assemblies change planes, provide isometric or clearly detailed drawing depicting how components interconnect.
- C. Samples for Initial Selection: For each type of exposed finish.
  - 1. Include manufacturer's color charts showing the full range of colors and finishes available for each exposed metal and elastomeric-seal material.
- D. Expansion Joint Cover Assembly Schedule: Prepared by or under the supervision of the supplier. Include the following information in tabular form:
  - 1. Manufacturer and model number for each expansion joint cover assembly.
  - 2. Expansion joint cover assembly location cross-referenced to Drawings.
  - 3. Nominal, minimum, and maximum joint width.
  - 4. Movement direction.
  - 5. Materials, colors, and finishes.
  - 6. Product options.
  - 7. Fire-resistance ratings.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: For each fire-resistance-rated expansion joint cover assembly, for tests performed by a qualified testing agency.

### PART 2 - PRODUCTS

#### 2.1 ASSEMBLY DESCRIPTION

- A. Furnish units in longest practicable lengths to minimize field splicing.
- B. Include factory-fabricated closure materials and transition pieces, T-joints, corners, curbs, cross-connections, and other accessories as required to provide continuous expansion joint cover assemblies.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Resistance Ratings: Provide expansion joint cover assemblies with fire barriers identical to those of systems tested for fire resistance according to UL 2079 or ASTM E 1966 by a qualified testing agency.
  - 1. Hose Stream Test: Wall-to-wall and wall-to-ceiling assemblies shall be subjected to hose stream testing.
- B. Expansion Joint Design Criteria:
  - 1. Type of Movement: Thermal.
    - a. Nominal Joint Width: As indicated on Drawings.
    - b. Minimum Joint Width: 50% nominal width.
    - c. Maximum Joint Width: 150% nominal width.

#### 2.3 EXTERIOR EXPANSION JOINT COVERS

- A. Exterior Elastomeric-Seal Joint Cover: Assembly consisting of elastomeric seal anchored to surface-mounted frames fixed to sides of joint gap.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide InPro Corporation (IPC); Model 615 Series or a comparable product by one of the following:
    - a. Balco, Inc.
    - b. Construction Specialties, Inc.
    - c. Nystrom, Inc.
  - 2. Application: Wall to wall, wall to soffit, and soffit to soffit, as applicable.
  - 3. Installation: Surface-mounted.
  - 4. Exposed Metal:
    - a. Aluminum: Clear anodic, Class II.
  - 5. Seal: Preformed elastomeric membrane or extrusion.
    - a. Color: As selected by Architect from manufacturer's full range.

## 2.4 FLOOR EXPANSION JOINT COVERS

- A. Glide-Plate Floor Joint Cover : Assembly consisting of center plate that slides in and out of slots in metal frames fixed to sides of joint gap.
1. Basis-of-Design Product: Subject to compliance with requirements, provide InPro Corporation (IPC); Model 300-A01 or a comparable product by one of the following:
    - a. Balco, Inc.
    - b. Construction Specialties, Inc.
    - c. Nystrom, Inc.
  2. Application: Floor to floor and floor to wall, as applicable.
  3. Installation: Recessed.
  4. Fire-Resistance Rating: Not less than that of adjacent construction.
  5. Exposed Metal:
    - a. Aluminum: Mill.

## 2.5 WALL EXPANSION JOINT COVERS

- A. Metal-Plate Wall Joint Cover: Metal cover plate fixed on one side of joint gap with ratcheting connection and free to slide on other.
1. Basis-of-Design Product: Subject to compliance with requirements, provide InPro Corporation (IPC); 800 Series Cover Plate or a comparable product by one of the following:
    - a. Balco, Inc.
    - b. Construction Specialties, Inc.
    - c. Nystrom, Inc.
  2. Application: Wall to wall and wall to corner, as applicable.
  3. Fire-Resistance Rating: Not less than that of adjacent construction.
  4. Exposed Metal:
    - a. Aluminum: Clear anodic, Class II.

## 2.6 CEILING EXPANSION JOINT COVERS

- A. Elastomeric-Seal Acoustical Ceiling Joint Cover: Elastomeric-seal assembly designed for use in acoustical ceilings.
1. Basis-of-Design Product: Subject to compliance with requirements, provide InPro Corporation (IPC) ; 115 Series Acoustical Ceiling Expansion Joint System or a comparable product by one of the following:
    - a. Balco, Inc.
    - b. Construction Specialties, Inc.
    - c. Nystrom, Inc.
  2. Application: ceiling to ceiling and wall to ceiling, as applicable.
  3. Fire-Resistance Rating: Not less than that of adjacent construction.
  4. Seal: Preformed elastomeric membranes or extrusions.
    - a. Color: As selected by Architect from manufacturer's full range.

## 2.7 MATERIALS

- A. Aluminum: ASTM B 221, Alloy 6063-T5 for extrusions; ASTM B 209, Alloy 6061-T6 for sheet and plate.
  - 1. Apply manufacturer's standard protective coating on aluminum surfaces to be placed in contact with cementitious materials.
- B. Elastomeric Seals: Manufacturer's standard preformed elastomeric membranes or extrusions to be installed in metal frames.
- C. Fire Barriers: Any material or material combination, when fire tested after cycling, designated to resist the passage of flame and hot gases through a movement joint and to comply with performance criteria for required fire-resistance rating.
- D. Moisture Barrier: Manufacturer's standard, flexible elastomeric material.
- E. Nonmetallic, Shrinkage-Resistant Grout: ASTM C 1107/C 1107M, factory-packaged, nonmetallic aggregate grout, noncorrosive, nonstaining, mixed with water to consistency suitable for application and a 30-minute working time.

## 2.8 ALUMINUM FINISHES

- A. Mill finish.
- B. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

## 2.9 ACCESSORIES

- A. Moisture Barriers: Manufacturer's standard continuous, waterproof membrane within joint and attached to substrate on sides of joint.
  - 1. Provide where indicated on Drawings.
- B. Manufacturer's stainless-steel attachment devices. Include anchors, clips, fasteners, set screws, spacers, and other accessories compatible with material in contact, as indicated or required for complete installations.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine surfaces where expansion joint cover assemblies will be installed for installation tolerances and other conditions affecting performance of the Work.
- B. Notify Architect where discrepancies occur that will affect proper expansion joint cover assembly installation and performance.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare substrates according to expansion joint cover assembly manufacturer's written instructions.
- B. Coordinate and furnish anchorages, setting drawings, and instructions for installing expansion joint cover assemblies. Provide fasteners of metal, type, and size to suit type of construction indicated and to provide for secure attachment of expansion joint cover assemblies.

### 3.3 INSTALLATION

- A. Comply with manufacturer's written instructions for storing, handling, and installing expansion joint cover assemblies and materials unless more stringent requirements are indicated.
- B. Metal Frames: Perform cutting, drilling, and fitting required to install expansion joint cover assemblies.
  - 1. Repair or grout block out as required for continuous frame support using nonmetallic, shrinkage-resistant grout.
  - 2. Install frames in continuous contact with adjacent surfaces.
    - a. Shimming is not permitted.
  - 3. Install in true alignment and proper relationship to joints and adjoining finished surfaces measured from established lines and levels.
  - 4. Adjust for differences between actual structural gap and nominal design gap due to ambient temperature at time of installation.
  - 5. Cut and fit ends to accommodate thermal expansion and contraction of metal without buckling of frames.
  - 6. Locate anchors at interval recommended by manufacturer, but not less than 3 inches from each end and not more than 24 inches o.c.
- C. Seals: Install elastomeric seals and membranes in frames to comply with manufacturer's written instructions. Install with minimum number of end joints.
  - 1. Provide in continuous lengths for straight sections.
  - 2. Seal transitions. Vulcanize or heat-weld field-spliced joints as recommended by manufacturer.
  - 3. Installation: Mechanically lock seals into frames or adhere to frames with adhesive or pressure-sensitive tape as recommended by manufacturer.
- D. Install with hairline mitered corners where expansion joint cover assemblies change direction or abut other materials.
- E. Terminate exposed ends of expansion joint cover assemblies with field- or factory-fabricated termination devices.
- F. Fire-Resistance-Rated Assemblies: Coordinate installation of expansion joint cover assembly materials and associated work so complete assemblies comply with performance requirements.
  - 1. Fire Barriers: Install fire barriers to provide continuous, uninterrupted fire resistance throughout length of joint, including transitions and field splices.

3.4 PROTECTION

- A. Do not remove protective covering until finish work in adjacent areas is complete. When protective covering is removed, clean exposed metal surfaces to comply with manufacturer's written instructions.
- B. Protect the installation from damage by work of other Sections. Where necessary due to heavy construction traffic, remove and properly store cover plates or seals and install temporary protection over expansion joint cover assemblies. Reinstall cover plates or seals prior to Substantial Completion.

END OF SECTION

## SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Steel doors.
  - 2. Steel door frames.
  - 3. Fire-rated door and frame assemblies.

#### 1.3 DEFINITIONS

- A. Steel Sheet Thicknesses: Thickness dimensions, including those referenced in ANSI A250.8, are minimums as defined in referenced ASTM standards for both uncoated steel sheet and the uncoated base metal of metallic-coated steel sheets.

#### 1.4 SUBMITTALS

- A. Product Data: For each type of door and frame indicated, include door designation, type, level and model, material description, core description, construction details, label compliance, sound and fire-resistance ratings, and finishes.
- B. Door Schedule: Use same reference designations indicated on Drawings in preparing schedule for doors and frames.
- C. Oversize Construction Certificates: For door assemblies required to be fire-protection rated and exceeding size limitations of labeled assemblies.

#### 1.5 QUALITY ASSURANCE

- A. Steel Door and Frame Standard: Comply with ANSI A 250.8, unless more stringent requirements are indicated.
- B. Fire-Rated Door 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.
  - 1. Test Pressure: Test at atmospheric (neutral) pressure according to NFPA 252 or UL 10B.
- C. Smoke-Control Door Assemblies: Comply with NFPA 105 or UL 1784

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver doors and frames cardboard-wrapped or crated to provide protection during transit and job storage. Provide additional protection to prevent damage to finish of factory-finished doors and frames.
- B. Inspect doors and frames on delivery for damage, and notify shipper and supplier if damage is found. Minor damages may be repaired provided refinished items match new work and are acceptable to Architect. Remove and replace damaged items that cannot be repaired as directed.
- C. Store doors and frames at building site under cover. Place units on minimum 4-inch-wood blocking. Avoid using nonvented plastic or canvas shelters that could create a humidity chamber. If door packaging becomes wet, remove cartons immediately. Provide minimum 1/4-inch between stacked doors to permit air circulation.

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Hot-Rolled Steel Sheet: ASTM A 1011, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.
- B. Cold-Rolled Steel Sheet: ASTM A 1008, Commercial Steel (CS), Type B; suitable for exposed applications.
- C. Metallic-Coated Steel Sheet: ASTM A 653, Commercial Steel (CS), Type B, with minimum A40 metallic coating.
- D. Frame Anchors: ASTM A 591, Commercial Steel (CS), 40Z coating designation; mill phosphatized.
- E. Grout: ASTM C 476, except with a maximum slump of 4 inches, as measured according to ASTM C 143.
- F. Mineral-Fiber Insulation: ASTM C 665, Type I (blankets without membrane facing); consisting of fibers manufactured from slag or rock wool with 6- to 12-lb/cu. ft. density; with maximum flame-spread and smoke-development indexes of 25 and 50, respectively; passing ASTM E 136 for combustion characteristics.
- G. Bituminous Coating: Cold-applied asphalt mastic, SSPC-Paint 12, compounded for 15-mil dry film thickness per coat. Provide inert-type noncorrosive compound free of asbestos fibers, sulfur components, and other deleterious impurities.

### 2.2 DOORS

- A. General: Provide doors of sizes, thicknesses, and designs indicated.

- B. Interior Doors: Unless shown otherwise, provide doors complying with requirements indicated below by referencing ANSI 250.8 for level and model and ANSI A250.4 for physical-endurance level:
  - 1. Level 2 and Physical Performance Level B (Heavy Duty), Model 2 (Seamless) (0.042-inch / 18 ga. thick).
- C. Exterior Doors: Provide doors complying with requirements indicated below by referencing ANSI A250.8 for level and model and ANSI A250.4 for physical-endurance level:
  - 1. Level 3 and Physical Performance Level A (Extra Heavy Duty), Model 2 (Seamless, fully-welded) (0.053-inch / 16 ga. thick).
- D. Vision Lite Systems: Manufacturer's standard kits consisting of glass lite moldings to accommodate glass thickness and size of vision lite indicated.
  - 1. Provide insulating unit in doors separating air-conditioned and evaporative-cooled spaces.

## 2.3 FRAMES

- A. General: Provide steel frames for doors, transoms, sidelights, borrowed lights, and other openings that comply with ANSI A250.8 and with details indicated for type and profile. Conceal fastenings, unless otherwise indicated.
- B. Frames of 0.053-inch- (16 ga.) thick steel sheet for:
  - 1. Levels 2 and 3 steel doors, unless otherwise indicated.
- C. Door Silencers: Except on weather-stripped frames, fabricate stops to receive three silencers on strike jambs of single-door frames and two silencers on heads of double-door frames.
- D. Plaster Guards: Provide 0.020-inch- (24 ga.) thick, steel sheet plaster guards or mortar boxes to close off interior of openings; place at back of hardware cutouts where mortar or other materials might obstruct hardware operation.
- E. Supports and Anchors: Fabricated from not less than 0.042-inch- (18 ga.) thick, electrolytic zinc-coated or metallic-coated steel sheet.
  - 1. Wall Anchors in Masonry Construction: 0.177-inch-diameter, steel wire complying with ASTM A 510 may be used in place of steel sheet.
- F. Hardware reinforcing gages shall comply with Table 4 of ANSI A250.8/SDI 100 Document.
- G. Inserts, Bolts, and Fasteners: Manufacturer's standard units. Where zinc-coated items are to be built into exterior walls, comply with ASTM A 153, Class C or D as applicable.

## 2.4 FABRICATION

- A. General: Fabricate steel door and frame units to comply with ANSI A250.8 and to be rigid, neat in appearance, and free from defects including warp and buckle. Where practical, fit and assemble units in manufacturer's plant. Clearly identify work that cannot be permanently factory assembled before shipment, to assure proper assembly at Project site.

- B. Exterior Door Construction: For exterior locations and elsewhere as indicated, fabricate doors, and frames from metallic-coated steel sheet. Close top and bottom edges of doors flush as an integral part of door construction or by addition of 0.053-inch- (16 ga.) thick, metallic-coated steel channels with channel webs placed even with top and bottom edges.
- C. Interior Door Faces: Fabricate exposed faces of doors from the following material:
  - 1. Cold-rolled steel sheet, unless otherwise indicated.
- D. Core Construction: Manufacturer's standard core construction that produces a door complying with SDI standards.
- E. Clearances for Non-Fire-Rated Doors: Not more than 1/8 inch at jambs and heads, except not more than 1/4 inch between pairs of doors. Not more than 3/4 inch at bottom.
- F. Clearances for Fire-Rated Doors: As required by NFPA 80.
- G. Single-Acting, Door-Edge Profile: Bevel edges 1/8 inch in 2 inches.
- H. Tolerances: Comply with SDI 117, "Manufacturing Tolerances for Standard Steel Doors and Frames."
- I. Fabricate concealed stiffeners, reinforcement, edge channels, louvers, and moldings from either cold- or hot-rolled steel sheet.
- J. Exposed Fasteners: Unless otherwise indicated, provide countersunk flat or oval heads for exposed screws and bolts.
- K. Hardware Preparation: Prepare doors and frames to receive mortised and concealed hardware according to final door hardware schedule and templates provided by hardware supplier. Comply with applicable requirements in ANSI A250.6 and ANSI A115 Series specifications for door and frame preparation for hardware.
- L. Frame Construction: Fabricate frames to shape shown.
  - 1. Fabricate frames with mitered and full profile welded corners and seamless face joints (knock-down frames not acceptable).
  - 2. Fabricate exterior door frames with integral metal drip.
- M. Reinforce doors and frames to receive surface-applied hardware. Drilling and tapping for surface-applied hardware may be done at Project site.
- N. Locate hardware as indicated on Shop Drawings or, if not indicated, according to ANSI A250.8.
- O. Glazing Stops: Manufacturer's standard, formed from 0.032-inch-thick (20 ga.) steel sheet.
  - 1. Provide nonremovable stops on outside of exterior doors and on secure side of interior doors for glass, louvers, and other panels in doors.
  - 2. Provide screw-applied, removable, glazing stops on inside of glass, louvers, and other panels in doors, using vandal-resistant screws.

## 2.5 FINISHES

- A. Prime Finish: Factory-applied coat of rust-inhibiting primer, compatible with paint finish as specified in Section 09 9000 "Painting," complying with ANSI A250.10 for acceptance criteria.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Install steel doors, frames, and accessories according to ANSI A250.8, manufacturer's data, and as specified.
  - 1. Apply bituminous coating to backs of frames that are filled with mortar, grout, and sound-deadening material.
- B. Placing Frames: Comply with provisions in SDI 105. Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is completed, remove temporary braces and spreaders, leaving surfaces smooth and undamaged.
  - 1. Place frames before construction of enclosing walls and ceilings.
  - 2. Metal-Stud Partitions: Solidly pack mineral-fiber insulation behind frames.
  - 3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
  - 4. Install fire-rated frames according to NFPA 80.
- C. Door Installation: Comply with ANSI A250.8. Fit hollow-metal doors accurately in frames, within clearances specified in ANSI A250.8. Shim as necessary to comply with SDI 122 and ANSI/DHI A115.1G.
  - 1. Fire-Rated Doors: Install within clearances specified in NFPA 80.

### 3.2 ADJUSTING AND CLEANING

- A. Prime-Coat Touchup: Immediately after installation, sand smooth any rusted or damaged areas of prime coat and apply touch up of compatible air-drying primer.
- B. Protection Removal: Immediately before final inspection, remove protective wrappings from doors and frames.

END OF SECTION



## SECTION 081416 - FLUSH WOOD DOORS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Solid-core doors with wood-veneer faces.
  - 2. Factory finishing flush wood doors.
  - 3. Factory fitting flush wood doors to frames and factory machining for hardware.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of door, including details of core and edge construction, trim for openings, and factory-finishing specifications.
- B. Shop Drawings: Indicate location and size of each door, elevation of each kind of door, details of construction, location and extent of hardware blocking, fire ratings, requirements for veneer matching and factory finishing and other pertinent data.
  - 1. For factory-machined doors, indicate dimensions and locations of cutouts for locksets and other cutouts adjacent to light openings.
- C. Samples for verification in the form and size indicated below:
  - 1. Finish sample with same materials proposed for factory-finished doors.

#### 1.4 INFORMATIONAL SUBMITTAL

- A. Sample Warranty: For special warranty.

#### 1.5 QUALITY ASSURANCE

- A. Quality Standard: Comply with the following standard:
  - 1. AWI/AWMAC/WI: "Architectural Woodwork Quality Standards" for grade of door, core, construction, finish, and other requirements.
- B. Fire-Rated Wood Doors: Doors complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated.
  - 1. Where requirements for positive pressure must be met, doors shall include all requirements as part of the door construction in accordance with Category A guidelines published by ITS/Warnock Hersey. No intumescent is allowed on the frame. Only smoke gasketing applied around perimeter of the frame to meet the "S" rating shall be acceptable.

- C. Single-Source Responsibility: Obtain doors from one source and by a single manufacturer.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Protect doors during transit, storage, and handling to prevent damage, soiling, and deterioration. Comply with requirements of referenced standard and manufacturer's instructions.
- B. Identify each door with individual opening numbers as designated on shop drawings, using temporary, removable, or concealed markings.

#### 1.7 PROJECT CONDITIONS

- A. Conditioning: Do not deliver or install doors until conditions for temperature and relative humidity have been stabilized and will be maintained in storage and installation areas during the remainder of the construction period to comply with the following requirements applicable to Project's geographical location:
  - 1. AWI Quality Standard Section 2 "Care and Storage."

#### 1.8 WARRANTY

- A. General Warranty: Warranties shall be in addition to, and not a limitation of, other rights the Owner may have under requirements of the Contract Documents.
- B. Door Manufacturer's Warranty: Submit written agreement on door manufacturer's standard form signed by manufacturer, Installer, and Contractor, agreeing to repair or replace defective doors that have warped (bow, cup, or twist) more than 1/4 inch in a 42-by-84-inch section or that show telegraphing of core construction in face veneers exceeding 0.01 inch in a 3-inch span, or do not conform to tolerance limitations of referenced quality standards.
  - 1. Warranty shall also include installation and finishing that may be required due to repair or replacement of defective doors where defect was not apparent prior to hanging.
  - 2. Warranty shall be in effect during the following period of time after date of Substantial Completion.
    - a. Solid Core Interior Doors: Life of installation.
- C. Contractor's Responsibilities: Replace and refinish doors where Contractor's work contributed to rejection or to voiding of manufacturer's warranty.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide doors by one of the following:
  - 1. Solid Core Doors With Wood Veneer Faces:
    - a. Algoma Hardwoods Inc.
    - b. Eggers Industries.
    - c. Graham Wood Doors; ASSA ABLOY Group company
    - d. Marshfield DoorSystems, Inc.
    - e. VT Industries.

2. Note: Rated doors shall meet positive pressure requirements of NFPA 80. Refer to Paragraph 1.4 above.

## 2.2 INTERIOR FLUSH WOOD DOORS

- A. Solid Core Doors for Transparent Finish: Comply with the following requirements:
  1. Faces: Honduras Mahogany; plain slice.
  2. Grade: Custom (Veneer Face: Grade A).
  3. Construction: PC-5.
  4. Bonding: Stiles and rails bonded to core, then entire unit abrasive planed before veneering.
- B. 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 positive pressure according to NFPA 252.
  1. Temperature-Rise Limit: At exit enclosures and exit passageways, provide doors that have a maximum transmitted temperature end point of not more than 450 deg F (250 deg C) above ambient after 30 minutes of standard fire-test exposure.
  2. Cores: Provide core specified or mineral core as needed to provide fire-protection rating indicated.
  3. Edge Construction: Provide edge construction with intumescent seals concealed by outer stile. Comply with specified requirements for exposed edges.
  4. Pairs: Provide fire-retardant stiles that are listed and labeled for applications indicated without formed-steel edges and astragals. Provide stiles with concealed intumescent seals. Comply with specified requirements for exposed edges.

## 2.3 VENEER MATCHING

- A. Within Door Faces: Provide doors with the following veneer matching:
  1. Book match.
- B. Pairs and Sets: Provide pair matching and set matching for pairs of doors and for doors hung in adjacent sets (balanced).

## 2.4 LIGHT FRAMES

- A. Wood-Veneered Beads for Light Openings in Fire Doors: Manufacturer's standard wood-veneered steel beads matching veneer species of door faces and approved for use in doors of fire-rating indicated.

## 2.5 FABRICATION

- A. Fabricate flush wood doors to comply with following requirements:
  1. Factory fit doors to suit frame-opening sizes indicated, with the following uniform clearances and bevels:
    - a. Comply with clearance requirements of referenced quality standard for fitting. Comply with requirements of NFPA 80 for fire-resistance-rated doors.

2. Factory machine doors for hardware that is not surface applied. Locate hardware to comply with DHI-WDHS-3. Comply with final hardware schedules, door frame shop drawings, BHMA-156.115-W series standards, and hardware templates.
    - a. Coordinate measurements of hardware mortises in metal frames to verify dimensions and alignment before proceeding with factory machining.
  - B. Openings: Cut and trim openings through doors to comply with applicable requirements of referenced standards for kind(s) of door(s) required.
    1. Light Openings: Trim openings with moldings of material and profile indicated.
- 2.6 FACTORY FINISHING
- A. General: Comply with referenced AWI quality standard's requirements for factory finishing.
  - B. Finish wood doors at factory.
  - C. Transparent Finish: Comply with requirements indicated for grade, finish system, staining effect, and sheen.
    1. Grade: Custom.
    2. Finish: AWS System TR-6 catalyzed polyurethane as standard with manufacturer.
    3. Staining: Clear.
    4. Effect: Open-grain finish.
    5. Sheen: Satin.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine installed door frames prior to hanging door:
  1. Verify that frames comply with indicated requirements for type, size, location, and swing characteristics and have been installed with plumb jambs and level heads.
  2. Reject doors with defects.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Hardware: For installation see Division 08 Section "Door Hardware."
- B. Manufacturer's Instructions: Install wood doors to comply with manufacturer's instructions and referenced AWI quality standard and as indicated.
  1. Install fire-rated doors in corresponding fire-rated frames according to requirements of NFPA 80.

- C. Job-Fit Doors (Contractor's Option): Align and fit doors in frames with uniform clearances and bevels as indicated below; do not trim stiles and rails in excess of limits set by manufacturer or permitted with fire-rated doors. Machine doors for hardware. Seal cut surfaces after fitting and machining.
1. Fitting Clearances for Non-Fire-Rated Doors: Provide 1/8 inch at jambs and heads, 1/16 inch per leaf at meeting stiles for pairs of doors, and 1/8 inch from bottom of door to top of decorative floor finish or covering. Where threshold is shown or scheduled, provide 1/4-inch clearance from bottom of door to top of threshold.
  2. Fitting Clearances for Fire-Rated Doors: Comply with NFPA 80.
  3. Bevel non-fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) at lock and hinge edges.
  4. Bevel fire-rated doors 1/8 inch in 2 inches (3-1/2 degrees) on lock edge; trim stiles and rails only to extent permitted by labeling agency.

(NOTE: If Contractor exercises this Option in lieu of providing factory-fitted doors, standard of workmanship and finish materials shall remain equivalent to factory-prefit standard.)

- D. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.
- E. Factory-Finished Doors: Restore finish before installation, if fitting or machining is required at the job site.

### 3.3 ADJUSTING AND PROTECTION

- A. Operation: Rehang or replace doors that do not swing or operate freely.
- B. Finished Doors: Refinish or replace doors damaged during installation.
- C. Protect doors as recommended by door manufacturer to ensure that wood doors will be without damage or deterioration at the time of Substantial Completion.

END OF SECTION



## SECTION 08 3113 - ACCESS DOORS AND FRAMES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Wall and ceiling access doors and frames.
  - 2. Fire-rated wall and ceiling access doors and frames.

#### 1.3 SUBMITTALS

- A. Product Data: In the form of manufacturer's technical data and installation instructions for each type of access door assembly, including setting drawings, templates, instructions, and directions for installation of anchorage, devices.
  - 1. Include complete schedule, including types, general locations, sizes, wall and ceiling construction details, finishes, latching or locking provisions, and other data pertinent to installation.
- B. Shop Drawings: Show fabrication and installation of customized access doors and frames, including details of each frame type, elevations of door design types, anchorage and accessory items.
  - 1. Show locations of access panels, ensuring that a panel is located within 12 inches of each valve.

#### 1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility: Obtain access doors for entire project from one source from a single manufacturer.
- B. Fire-Resistance Ratings: Wherever a fire-resistance classification is indicated, provide access door assembly with panel door, frame, hinge, and latch from manufacturer listed in Underwriters Laboratories, Inc.'s "Building Materials Directory" for rating shown.
  - 1. Provide UL label on each fire-rated access door.
- C. Size Variations: Obtain Architect's acceptance of manufacturer's standard size units, which may vary slightly from sizes indicated.
- D. Coordination: Furnish inserts and anchoring devices that must be built into other work for installation of access doors. Coordinate delivery with other work to avoid delay.

1.5 PROJECT CONDITIONS

- A. Verification: Obtain specific locations and sizes for required access doors from trades requiring access to concealed equipment, and indicate on submittal schedule.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide access doors by one of the following:
  1. Dur-Red Products
  2. J.L. Industries
  3. Karp Associates, Inc.
  4. Milcor, Inc.
  5. Nystrom, Inc.
  6. The Williams Brothers Corp.

2.2 MATERIALS AND FABRICATION, TYPICAL DOORS

- A. General: Furnish each access door assembly manufactured as an integral unit, complete with all parts, and ready for installation.
- B. Steel Access Doors and Frames: Fabricate units of continuous welded steel construction unless otherwise indicated. Grind welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access panels to types of support shown.
  1. Units at Toilet Rooms shall be #304 stainless steel with #4 satin finish (frame and panel).
- C. Frames: Fabricate from 16-gage steel.
  1. Fabricate frame with exposed flange nominal 1-inch wide around perimeter of frame for units installed in the following construction: Drywall finish.
  2. For gypsum drywall, furnish perforated frames with drywall bead.
- D. Flush Panel Doors: Fabricate from not less than 14-gage sheet steel, with concealed spring hinges or concealed continuous piano hinge set to open 175 degrees. Finish with manufacturer's factory-applied prime paint.
  1. For fire-rated units, provide manufacturer's standard insulated flush panel/doors, with continuous piano hinge and self-closing mechanism.
  2. Provide unit similar to Williams Brothers Model WB-FR Premium Fire-Rated Access Door.
- E. Locking Devices: Furnish number required to hold door in flush, smooth plane when closed.
  1. Provide cylinder lock at rated doors, furnishing 2 keys per lock. Key all locks alike, unless otherwise scheduled.
  2. Screwdriver-operated cam lock on regular (non-rated) drywall doors.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Comply with manufacturer's instructions for installation of access doors.
- B. Coordinate installation with work of other trades.
- C. Set frames accurately in position and securely attach to supports with face panels plumb or level in relation to adjacent finish surfaces.
- D. In addition to other locations, provide access panels no further than 12 inches from any valve.

3.2 ADJUST AND CLEAN

- A. Adjust hardware and panels after installation for proper operation.
- B. Remove and replace panels or frames that are warped, bowed, or otherwise damaged.

END OF SECTION



## SECTION 08 4113 - 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 storefront framing.
  - 2. Storefront framing for punched openings.
  - 3. Exterior manual-swing entrance doors and door-frame units.
- B. Related Requirements:
  - 1. Section 08 4413 "Glazed Aluminum Curtain Walls."

#### 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 construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.
  - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
  - 2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:
    - a. Joinery, including concealed welds.
    - b. Anchorage.
    - c. Expansion provisions.
    - d. Glazing.
    - e. Flashing and drainage.
  - 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

- C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- D. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch 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.
- E. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.
  - 1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.
- C. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by a qualified testing agency.
- D. Field quality-control reports.
- E. Sample Warranties: For special warranties.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

#### 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.
- C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated

by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

## 1.8 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration created by wind and thermal and structural movements.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - d. Water penetration through fixed glazing and framing areas.
    - e. Failure of operating components.
  2. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
  1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
    - e. Failure of operating units.
- B. Structural Loads:
  1. Wind Loads: As indicated on Drawings.
- C. Deflection of Framing Members: At design wind pressure, as follows:
  1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.

2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.
- D. Structural: Test according to ASTM E 330 as follows:
1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
  2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
  3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- E. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
1. Fixed Framing and Glass Area:
    - a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.
  2. Entrance Doors:
    - a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
    - b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. at a static-air-pressure differential of 1.57 lbf/sq. ft.
- F. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft.
- G. Water Penetration under Dynamic Pressure: Test according to AAMA 503 as follows:
1. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
- H. Energy Performance: Certify and label energy performance according to NFRC as follows:
1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
  2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.45 as determined according to NFRC 200.
  3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 25 as determined according to NFRC 500.
- I. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

## 2.2 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Arcadia, Inc., in system as indicated below or comparable product by one of the following:
1. EFCO Corporation.
  2. Kawneer North America; an Alcoa company.
  3. Oldcastle BuildingEnvelope™.
  4. Trulite Glass & Aluminum Solutions, LLC.
- B. Framing System:
1. Interior locations: AR450.
  2. Exterior locations: AG451T.
- C. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

## 2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
1. Construction:
    - a. Interior Locations: Non-thermal.
    - b. Exterior Locations: Thermally broken.
  2. Glazing System: Retained mechanically with gaskets on four sides.
  3. Glazing Plane: Center.
  4. Finish: Clear anodic finish.
  5. Fabrication Method: Field-fabricated stick system.
- B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- D. Materials:
1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
    - a. Sheet and Plate: ASTM B 209.
    - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
    - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
    - d. Structural Profiles: ASTM B 308/B 308M.
  2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
    - a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
    - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
    - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

## 2.4 ENTRANCE DOOR SYSTEMS

- A. Entrance Doors: Manufacturer's standard glazed entrance doors for manual-swing operation.
1. Door Construction: 1-3/4-inch overall thickness, with minimum 0.125-inch-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.
  2. Basis-of-Design Product: MS362 as manufactured by Arcadia, Inc.
  3. Door Design: Medium stile; 3-1/2-inch nominal width.
  4. Glazing Stops and Gaskets: Square, snap-on, extruded-aluminum stops and preformed gaskets.
    - a. Provide nonremovable glazing stops on outside of door.

## 2.5 ENTRANCE DOOR HARDWARE

- A. Entrance Door Hardware: Refer to Section 08 7100 "Door Hardware."
- B. Materials:
1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
    - a. Sheet and Plate: ASTM B 209.
    - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
    - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
    - d. Structural Profiles: ASTM B 308/B 308M.

## 2.6 GLAZING

- A. Glazing: Comply with Section 08 8000 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed storefront manufacturers for this use.

## 2.7 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
  2. Reinforce members as required to receive fastener threads.

- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
  - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Concealed Flashing: Dead-soft, 0.018-inch- thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

## 2.8 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Physical and thermal isolation of glazing from framing members.
  - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 5. Provisions for field replacement of glazing from interior.
  - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
- E. Storefront Framing: Fabricate components for assembly using screw-spline system.
- F. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
  - 1. At exterior doors, provide compression weather stripping at fixed stops.
  - 2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.
- G. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
  - 1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
  - 2. At exterior doors, provide weather sweeps applied to door bottoms.

- H. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
- I. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

## 2.9 ALUMINUM FINISHES

- A. Clear Anodic Finish: AAMA 611, AA-M12C22A31, Class II, 0.010 mm or thicker.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

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

### 3.2 PREPARATION

- A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

### 3.3 INSTALLATION

- A. General:
  - 1. Comply with manufacturer's written instructions.
  - 2. Do not install damaged components.
  - 3. Fit joints to produce hairline joints free of burrs and distortion.
  - 4. Rigidly secure nonmovement joints.
  - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
  - 6. Seal perimeter and other joints watertight unless otherwise indicated.
- B. Metal Protection:
  - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
  - 2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

- C. Set continuous sill members and flashing in full sealant bed as specified in Section 07 9200 "Joint Sealants" to produce weathertight installation.
- D. Install components plumb and true in alignment with established lines and grades.
- E. Install glazing as specified in Section 08 8000 "Glazing."
- F. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
  - 1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
  - 2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

### 3.4 ERECTION TOLERANCES

- A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:
  - 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
  - 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
  - 3. Alignment:
    - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
    - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
    - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
  - 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.
  - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 503 and shall not evidence water penetration.
    - a. Perform a minimum of two tests in areas as directed by Architect.
- C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.

END OF SECTION



## SECTION 08 4413 - GLAZED ALUMINUM CURTAIN WALLS

### 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:
  - 1. Glazed aluminum curtain walls.
  - 2. Exterior sun control devices.
- B. Related Requirements:
  - 1. Section 05 5000 "Metal Fabrications" for sun control at fenestration other than at curtain walls.
  - 2. Section 08 4113 "Aluminum-Framed Entrances and Storefront."

#### 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 construction details, material descriptions, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For glazed aluminum curtain walls. Include plans, elevations, sections, full-size details, and attachments to other work.
  - 1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
  - 2. Include full-size isometric details of each vertical-to-horizontal intersection of glazed aluminum curtain walls, showing the following:
    - a. Joinery, including concealed welds.
    - b. Anchorage.
    - c. Expansion provisions.
    - d. Glazing.
    - e. Flashing and drainage.
  - 3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

- C. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.
- D. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch 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.
- E. Delegated-Design Submittal: For glazed aluminum curtain walls indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Energy Performance Certificates: For glazed aluminum curtain walls, accessories, and components from manufacturer.
  - 1. Basis for Certification: NFRC-certified energy performance values for each glazed aluminum curtain wall.
- C. Product Test Reports: For glazed aluminum curtain walls, for tests performed by a qualified testing agency.
- D. Field quality-control reports.
- E. Sample Warranties: For special warranties.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For glazed aluminum curtain walls to include in maintenance manuals.
- B. Maintenance Data for Structural Sealant: For structural-sealant-glazed curtain walls to include in maintenance manuals. Include ASTM C 1401 recommendations for post-installation-phase quality-control program.

#### 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- B. Testing Agency Qualifications: Qualified according to ASTM E 699 for testing indicated.

- C. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.
  - 1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.
- D. Structural-Sealant Glazing: Comply with ASTM C 1401 for design and installation of curtain wall assemblies.

## 1.8 WARRANTY

- A. Special Assembly Warranty: Manufacturer agrees to repair or replace components of glazed aluminum curtain wall that do not comply with requirements or that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Structural failures including, but not limited to, excessive deflection.
    - b. Noise or vibration created by wind and thermal and structural movements.
    - c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
    - d. Water penetration through fixed glazing and framing areas.
    - e. Failure of operating components.
  - 2. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design glazed aluminum curtain walls.
- B. General Performance: Comply with performance requirements specified, as determined by testing of glazed aluminum curtain walls representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.
  - 1. Glazed aluminum curtain walls shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.
  - 2. Failure also includes the following:
    - a. Thermal stresses transferring to building structure.
    - b. Glass breakage.
    - c. Noise or vibration created by wind and thermal and structural movements.
    - d. Loosening or weakening of fasteners, attachments, and other components.
    - e. Failure of operating units.
- C. Structural Loads:
  - 1. Wind Loads: As indicated on Drawings.

- D. Deflection of Framing Members: At design wind pressure, as follows:
1. Deflection Normal to Wall Plane: Limited to 1/175 of clear span for spans up to 13 feet 6 inches and to 1/240 of clear span plus 1/4 inch for spans greater than 13 feet 6 inches or an amount that restricts edge deflection of individual glazing lites to 3/4 inch, whichever is less.
  2. Deflection Parallel to Glazing Plane: Limited to amount not exceeding that which reduces glazing bite to less than 75 percent of design dimension and that which reduces edge clearance between framing members and glazing or other fixed components to less than 1/8 inch.
  3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
    - a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4-inch for spans greater than 11 feet 8-1/4 inches or 1/175 times span, for spans less than 11 feet 8-1/4 inches.
- E. Structural: Test according to ASTM E 330 as follows:
1. When tested at positive and negative wind-load design pressures, assemblies do not evidence deflection exceeding specified limits.
  2. When tested at 150 percent of positive and negative wind-load design pressures, assemblies, including anchorage, do not evidence material failures, structural distress, or permanent deformation of main framing members exceeding 0.2 percent of span.
  3. Test Durations: As required by design wind velocity, but not less than 10 seconds.
- F. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:
1. Fixed Framing and Glass Area:
    - a. Maximum air leakage of 0.06 cfm/sq. ft. at a static-air-pressure differential of 6.24 lbf/sq. ft.
- G. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:
1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 15 lbf/sq. ft.
- H. Water Penetration under Dynamic Pressure: Test according to AAMA 503 as follows:
1. Maximum Water Leakage: No uncontrolled water penetrating assemblies or water appearing on assemblies' normally exposed interior surfaces from sources other than condensation. Water leakage does not include water controlled by flashing and gutters, or water that is drained to exterior.
- I. Energy Performance: Certify and label energy performance according to NFRC as follows:
1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F as determined according to NFRC 100.
  2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.40 as determined according to NFRC 200.
  3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 55 as determined according to NFRC 500.
- J. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

- K. Structural-Sealant Joints:
  - 1. Designed to produce tensile or shear stress of less than 20 psi.

## 2.2 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Arcadia, Inc., T500, OPG-1900 or comparable product by one of the following:
  - 1. EFCO Corporation.
  - 2. Kawneer North America; an Alcoa company.
  - 3. Oldcastle BuildingEnvelope™.
  - 4. Shuco USA LP.
  - 5. TRACO.
- B. Source Limitations: Obtain all components of curtain wall system, including framing entrances, sun control, and accessories, from single manufacturer.

## 2.3 FRAMING

- A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
  - 1. Glazing System: Retained mechanically with gaskets on four sides with structural silicone glazed corners.
  - 2. Glazing Plane: Front.
  - 3. Finish: Clear anodic finish.
  - 4. Fabrication Method: Field-fabricated stick system.
- B. Pressure Caps: Manufacturer's standard aluminum components that mechanically retain glazing.
  - 1. Include snap-on aluminum trim that conceals fasteners.
- C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.
- D. Materials:
  - 1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
    - a. Sheet and Plate: ASTM B 209.
    - b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221.
    - c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
    - d. Structural Profiles: ASTM B 308/B 308M.
  - 2. Steel Reinforcement: Manufacturer's standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
    - a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
    - b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
    - c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

## 2.4 ENTRANCES

- A. Entrances: Comply with Section 08 4113 "Aluminum-Framed Entrances and Storefronts."

## 2.5 SUN CONTROL

- A. Sunshades: Assemblies consisting of manufacturer's standard outrigger brackets, louvers, and fascia, designed for attachment to curtain wall with mechanical fasteners.
  - 1. Orientation: Horizontal and vertical.
  - 2. Projection from Wall: As indicated on Drawings.
  - 3. Outriggers: Straight with square edges, fabricated front Type 304 stainless steel with sating finish.
  - 4. Louvers:
    - a. Egg crate with 2- by 2-inch configuration, fabricated with 3/16-inch thick aluminum plate.
    - b. Depth: As indicated on Drawings.
    - c. Finish: Clear anodic finish.

## 2.6 GLAZING

- A. Glazing: Comply with Section 088000 "Glazing."
- B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
- C. Structural Glazing Sealants: ASTM C 1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in curtain-wall assembly indicated.
  - 1. Color: As selected by Architect from manufacturer's full range of colors.
- D. Weatherseal Sealants: ASTM C 920 for Type S; Grade NS; Class 25; Uses NT, G, A, and O; chemically curing silicone formulation that is compatible with structural sealant and other system components with which it comes in contact; recommended by structural-sealant, weatherseal-sealant, and structural-sealant-glazed curtain-wall manufacturers for this use.
  - 1. Color: Match structural sealant.

## 2.7 ACCESSORIES

- A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.
  - 1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
  - 2. Reinforce members as required to receive fastener threads.

- B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.
  - 1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.
- C. Concealed Flashing: Dead-soft, 0.018-inch- thick stainless steel, ASTM A 240/A 240M of type recommended by manufacturer.
- D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil thickness per coat.

## 2.8 FABRICATION

- A. Form or extrude aluminum shapes before finishing.
- B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
- C. Fabricate components that, when assembled, have the following characteristics:
  - 1. Profiles that are sharp, straight, and free of defects or deformations.
  - 2. Accurately fitted joints with ends coped or mitered.
  - 3. Physical and thermal isolation of glazing from framing members.
  - 4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
  - 5. Provisions for field replacement of glazing from exterior.
  - 6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
- D. Fabricate components to resist water penetration as follows:
  - 1. Internal guttering system or other means to drain water passing joints, condensation occurring within framing members, and moisture migrating within glazed aluminum curtain wall to exterior.
- E. Curtain-Wall Framing: Fabricate components for assembly using manufacturer's standard assembly method.
- F. 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-M12C22A31, Class II, 0.010 mm or thicker.

2.10 SOURCE QUALITY CONTROL

- A. Structural Sealant: Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 PREPARATION

- A. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION

- A. General:
  - 1. Comply with manufacturer's written instructions.
  - 2. Do not install damaged components.
  - 3. Fit joints to produce hairline joints free of burrs and distortion.
  - 4. Rigidly secure nonmovement joints.
  - 5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
  - 6. Where welding is required, weld components in concealed locations to minimize distortion or discoloration of finish. Protect glazing surfaces from welding.
  - 7. Seal joints watertight unless otherwise indicated.
- B. Metal Protection:
  - 1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with primer, applying sealant or tape, or installing nonconductive spacers as recommended by manufacturer for this purpose.
  - 2. Where aluminum is in 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 glazed aluminum curtain wall to exterior.
- D. Install components plumb and true in alignment with established lines and grades.

- E. Install glazing as specified in Section 08 8000 "Glazing."
  - 1. Prepare surfaces that will contact structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.
- F. Install weatherseal sealant according to Section 07 9200 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.
- G. Install sun control devices per manufacturer's written instructions.

### 3.4 ERECTION TOLERANCES

- A. Erection Tolerances: Install glazed aluminum curtain walls to comply with the following maximum tolerances:
  - 1. Plumb: 1/8 inch in 10 feet; 1/4 inch in 40 feet.
  - 2. Level: 1/8 inch in 20 feet; 1/4 inch in 40 feet.
  - 3. Alignment:
    - a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch wide, limit offset from true alignment to 1/16 inch.
    - b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch wide, limit offset from true alignment to 1/8 inch.
    - c. Where surfaces are separated by reveal or protruding element of 1 inch wide or more, limit offset from true alignment to 1/4 inch.
  - 4. Location: Limit variation from plane to 1/8 inch in 12 feet; 1/2 inch over total length.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified testing agency to perform tests and inspections.
- B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.
  - 1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 503 and shall not evidence water penetration.
    - a. Perform a minimum of two tests in areas as directed by Architect.
- C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.
- D. Prepare test and inspection reports.
- E. Structural-Sealant Adhesion: Test structural sealant according to recommendations in ASTM C 1401, Destructive Test Method A, "Hand Pull Tab (Destructive)," Appendix X2.
  - 1. Test a minimum of two areas on each building facade.
  - 2. Repair installation areas damaged by testing.

- F. Glazed aluminum curtain walls will be considered defective if they do not pass tests and inspections.
- G. Prepare test and inspection reports.

END OF SECTION

## SECTION 08 7100 - DOOR HARDWARE

### 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. Division 06 – Woods, Plastics and Composites
- C. Division 08 - Openings
- D. Division 09 – Finishes.
- E. Division 26 - Electrical.

#### 1.2 SUMMARY

- A. Section Includes: Hardware and related items for interior and exterior doors, other than specified in specific door sections.

#### 1.3 SYSTEM DESCRIPTION

- A. Performance Requirements: The Manufacturer or Authorized Distributor shall confirm that there is an established local agency which stocks a full complement of parts and offers service during normal working hours for the finish hardware to be furnished and that the agency will supply parts without delay and at reasonable cost.
- B. 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, regardless of omissions or conflicts in the information in the Contract Documents.

#### 1.4 SUBMITTALS

- A. Submit shop drawings and product data of each type of hardware required for Project, in accordance with Division 01. Indicate the following:
  - 1. Style and finish.
  - 2. Locations and mounting heights of each item of hardware. Use established numbering system.
  - 3. Include a complete listing of equipment and materials including manufacturer, catalog number, finish, diagrams, (including cut-sheets), schematics and all other pertinent data.
  - 4. Wiring Diagrams for each electrical product specified. Coordinate voltage with electrical before submitting.
- B. Templates: Supply to Door and Frame Manufacturer(s) to enable proper and accurate sizing and locations of cutouts for hardware.

- C. Certification:
  - 1. At the completion of installation, certify that material is properly installed according to Manufacturers printed instructions.
  - 2. Submit certification that hardware for fire rated doors (including doors and frames as a unit) will comply with UL 10C (positive pressure testing) as required by current code requirements for this project.
  
- D. Operating and Maintenance Data: Submit in accordance with Division 01. Provide Owner with Manufacturer's parts list and maintenance instructions for each type of hardware supplied and necessary wrenches and tools required for proper maintenance of hardware.

#### 1.5 QUALITY ASSURANCE

- A. Standards: Comply with the following:
  - 1. ANSI/NFPA 80 - Fire Doors and Windows.
  - 2. UL Standard 305 - Panic Hardware.
  
- B. Regulatory Requirements:
  - 1. Comply with the following:
    - a. ANSI A117.1 "Accessible and Usable Buildings and Facilities."
    - b. Public Law 101-336 "The Americans with Disabilities Act of 1990 (ADA).
    - c. ADA Accessibility Guidelines (ADAAG).
    - d. Uniform Federal Accessibility Standards (UFAS).
  - 2. Hardware listed or furnished shall meet requirements of Federal, State and Local codes having jurisdiction.
  - 3. Any item furnished or installed that does not meet code requirements shall be removed and proper items substituted at no additional cost or expense to the Owner.
  - 4. Provide hardware for fire-rated openings in compliance with A.I.A. (NBFU) Pamphlet No. 80 and NFPA Standards No. 80 and No. 101 and UL 10(c) (positive pressure testing). This requirement shall take precedence over other requirements for such hardware.
  - 5. Provide hardware which has been tested and listed by U.L. for the types and sizes of doors required, and which complies with the requirements of the doors and door frame labels.
  - 6. Hardware on all doors leading to or from electrical rooms, mechanical rooms, service stairs, dock areas and the like which represent a hazard to the blind, shall have a tactile surface or knurling on the door lever, handle, or bar which will alert the user to potential perils present. The hardware product and installation shall satisfy all governing handicapped codes.
  
- C. Supplier and/ or Sub Contractor Qualifications:
  - 1. Employ an AHC member of the DHI.
  - 2. Factory authorized stocking distributor of the approved items.
  - 3. Holder of legally required licenses.
  - 4. Low Voltage License for State of Arizona.
  
- D. Manufacturer Qualifications: 5 years experience in manufacture of comparable systems.

## 1.6 DELIVERY, STORAGE AND HANDLING

- A. Packing and Shipping: Package each item of hardware in original and individual containers, complete with all necessary fastenings, keys, instructions, and templates for spotting mortising tools.
1. Mark each container with its item number corresponding to the item number on the finish hardware schedule.
  2. Containers holding locks shall show the following corresponding to that shown on the finish hardware schedule:
    - a. Heading number
    - b. Door number
    - c. Hand of door (when required)
    - d. Keying symbol (developed by Owner)
  3. A typewritten schedule in DHI format conforming with the approved schedule shall accompany each shipment.
- B. When hardware must be installed at the factory, the hardware supplier shall send all such needed items to the respective supplier for their use in installation. The cost of this shipping requirement shall be borne by the hardware supplier.
- C. Acceptance at Site: Upon delivery of the finish hardware to the job site, check in and sign for all material delivered and thereafter be responsible for same.
- D. Storage and Protection: Provide a secured area with sufficient space and shelving in which to store and inventory all materials under lock and key. Protect hardware from damage at all times.

## 1.7 WARRANTY

- A. Warranty hardware against defects in materials and workmanship for 2 years except as noted below. Repair, replace or otherwise correct deficient materials at no additional cost to Owner.
1. Locksets: 10 year warranty.
  2. Closers: 30 year warranty.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Approved manufactures for bidding:
1. Butts: Ives (IVE) <http://us.allegion.com/brands/ives/pages/default.aspx> , Bommer [www.bommerhinge.com](http://www.bommerhinge.com)
  2. Continuous Hinges: : Ives (IVE) <http://us.allegion.com/brands/ives/pages/default.aspx>, Select [www.selecthinge.com](http://www.selecthinge.com) .
  3. Locksets and Cylinders: Schlage (SCH) - <http://us.allegion.com/brands/schlage/pages/default.aspx> , Best (BES) [www.bestaccess.com](http://www.bestaccess.com)
  4. Permanent Cores: Best (BES) [www.bestaccess.com](http://www.bestaccess.com)
  5. Exit Devices: Von Duprin (VON) - [http://us.allegion.com/brands/von\\_duprin/pages/default.aspx](http://us.allegion.com/brands/von_duprin/pages/default.aspx) - No Substitution .
  6. Closers: LCN (LCN) –

7. <http://us.allegion.com/brands/lcn/pages/default.aspx> - No Substitution.  
Thresholds, Door Bottoms, Weatherstripping: Zero [www.zerointernational.com](http://www.zerointernational.com) ,  
National Guard (NGP) , Reese (REE)
8. Stops, Kickplates, Pulls, Push Plates: Ives (IVE) -  
<http://us.allegion.com/brands/ives/pages/default.aspx> Trimco (TRI)  
[www.trimcobbw.com](http://www.trimcobbw.com) .
9. Coordinators and Automatic Flush Bolts: Ives (IVE) -  
<http://us.allegion.com/brands/ives/pages/default.aspx> Trimco (TRI)  
[www.trimcobbw.com](http://www.trimcobbw.com) .
10. Electric Strikes: Von Duprin (VON) –  
[http://us.allegion.com/brands/von\\_duprin/pages/default.aspx](http://us.allegion.com/brands/von_duprin/pages/default.aspx) - No Substitution .

- B. To the greatest extent possible, obtain all finish hardware of the same type of item from only one Manufacturer except as specified otherwise in the hardware sets.

## 2.2 HARDWARE

### A. General:

1. Provide items as listed in schedule complete to function as intended.
2. Manufacture hardware supplied for metal doors or jambs to template and secure with machine screws.
3. Where cylindrical locks are used in hollow metal doors, furnish lock reinforcing in the door at the time of manufacture.
4. Furnish finish hardware with all necessary screws, bolts, or other fastenings of suitable; size and type to anchor the hardware in position for heavy use and long life, and of compatible material and finish.
5. Furnish fastenings with anchors according to the material to which it is applied, and as recommended by the Manufacturer.
6. Furnish hardware fastened to concrete with machine screws and tampins.
7. Fasten closers on wood or mineral core doors with fasteners recommended by the closer manufacturer for the apparent intended use of the device, unless the installation is in an opening requiring UL-rated hardware in which case sex nuts and bolts (approved by UL) are required by UL.
8. For surface mounted closer, pivot hinges, concealed closers or holders or other hardware mortised into the top or bottom edges, edges shall be a minimum of 5 inches of door manufacturers blocking, certified to eliminate the use of through bolts or otherwise securely fasten specified hardware..

- B. Finishes: US 26D (626), satin chrome, and US 32D (630), satin stainless steel, unless scheduled otherwise. Where primed items are specified final preparation and finish is provided by Division 09.

### C. Butt Hinges:

1. Determine correct clearance from the Drawings.
2. Provide non-removable pins on exterior outswinging doors and reverse bevel interior locked doors.
3. Doors with closers shall have ball bearing butts.
4. Flat button, top and bottom tips required.
5. Butt Hinge Length: As recommended by Manufacturer.
6. Number of Butt Hinges Required: As recommended by Manufacturer.

7. Furnish hinges with five knuckles and flush, concealed, bearings.
  8. Comply with the requirements of NFPA-80 for labeled openings.
- D. Geared Continuous Hinges:
1. Comply with ANSI/BHMA A156.26-1996, Grade 1.
  2. Non-Handed
  3. Listed for up to 3 hour fire rating
  4. Sufficient size to permit door to swing to 180 degrees where required.
- E. Door Locks and Latchsets: Types, series, designs, functions and finishes as listed in hardware sets.
1. Comply with ANSI/A156.2, Series 400, Operational Grade 1, Extra Heavy Duty and be UL10C Listed.
  2. Keyed lever to be removable only after core is removed, by authorized control key.
  3. Provide locksets with small format 7-pin interchangeable cores.
  4. Lockset to have minimum 1/2" latch throw or as otherwise required for labeled openings.
  5. Provide locks and latchsets with 2-3/4 inch backset unless otherwise noted.
  6. Provide 3/4" latch throw at pairs of doors.
  7. Provide strikes with extended lip where required to protect trim from being marred by latch bolt.
  8. Provide wrought boxes with strikes.
  9. Provide locks capable of installation for additional thickness of lock astragals which require mounting underneath the locks rose, where required.
  10. At cylinders provide the necessary cylinder housings, collars, rings, springs, cylinders cams or tail pieces as recommended by the manufacturer for proper installation.
- F. Door Closers:
1. Surface mounted without covers, finish sprayed to match other hardware.
  2. Comply with, ANSI/BHMA A156.4, Grade 1 and be UL10C certified
  3. Closer to be equipped with size adjustment (1 through 6) in the field by the installer.
  4. Equip closers mounted on wood or mineral core doors with conventional fasteners unless the manufacturer of the closer recommends sex nuts and bolt because of the apparent frequency use of the closer. In the event the door is indicated to be UL-rated, the sex nuts and bolts shall be UL approved.
  5. Closers to be installed on interior of door.
  6. Closers to be provided with separate adjusting valves for closing and latching speed and backcheck.
  7. Provide EDA arms for parallel applications.
  8. Maximum 2 7/16" case projection with non-ferrous cover.
  9. Types as listed in sets are for intent, Provide adapter plates, shim spacers, blade stop spacers, arms and closers as required by frame, door and other hardware conditions.
- G. Exit Devices:
1. U.L. approved for Casualty
  2. Comply with ANSI/BHMA A156.3, Grade 1.
  3. Fire doors to be equipped with Fire Exit Devices listed for UL10C.
  4. Devices to match in design.
  5. Exposed components shall be of architectural metals and finishes
  6. Types, functions and finishes as listed in hardware sets.
  7. Lever design shall match lock lever design.

8. Where mechanical dogging is required it shall be cylinder dogging.
9. Provide vandal resistant or breakaway trim.

- H. Push Plates: Type and size as listed.
- I. Pull Plates: Type and size as listed.
- J. Kickplates and Armorplates: Size as listed. Provide .050 inch thick stainless steel with No. 4 finish, edges ground smooth.
- K. Overhead Holders or Stops: As listed in hardware sets.
- L. Stops and Bumpers: As listed in sets. Where wall bumpers are used, locate to prevent lockset lever or closer from touching wall. Walls to receive proper backing for wall bumpers as specified in Division 06 Section "Rough Carpentry."
- M. Silencers: At metal frames; 3 at each jamb of single doors, 2 at each jamb of double doors. Not required on doors having weatherstrip or seals.
- N. Flushbolts: As listed in hardware sets.
- O. Weatherproofing, Smoke Seals and Door Bottoms:
  1. Continuous at head and jamb of exterior doors; continuous smoke seals at head and jamb of corridor doors.
- P. Thresholds: Sized for opening; to meet handicapped conditions. Provide as detailed on Drawings, or as listed in hardware sets.
- Q. Knox Box: Model 3200-R, 4"W x 5"H x 3-1/4" deep with 7"W x 7"H flange, black polyester powder coat finish.

### 2.3 KEYING

- A. Door Locks: Arrange a keying meeting with Architect, Owner, Hardware Supplier and other involved parties to ensure locksets, and locking hardware, are functionally correct and keying complies with project requirements. Master Key all locksets and cylinders to the Best (Grand) Masterkey system, standard keyway, as directed by the Owner. Provide temporary brass construction cores for all locksets and cylinders.
- B. Supply 3 keys for each lock.
- C. Supply additional keys/cores in following quantities:
  1. 2 master keys for each set.
  2. 1 grand master keys.
  3. 2 Permanent Control Keys
  4. 5 construction keys.

5. 2 construction control keys

- D. Permanent keys will not be made available to the General Contractor or any Subcontractor or Supplier under any circumstances. Transmit all permanent keys to Owner by Registered Mail, return receipt requested.
- E. The Owner, or the Owner's agent, will install permanent cores and return the construction cores to the hardware supplier. Construction cores and keys remain the property of the Hardware Supplier.
- F. Permanent Keys and Cores: Stamped with the applicable key mark for identification. These visial key control marks or codes will not include the actual key cuts. Permanent keys are to be stamped "Do Not Duplicate."

2.4 KEY CABINETS (NOT REQUIRED FOR THIS PROJECT)

- A. Provide one wall mounted key cabinet complete with hooks, index and tags Model REC-250S by Telkee.
- B. Finish: Baked enamel finish.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine conditions under which finish hardware will be installed. Report deficiencies to the Architect.

3.2 INSTALLATION

- A. Install hardware in accordance with Manufacturer's recommendations, using proper templates.
  - 1. Check and adjust closers to ensure proper operation.
    - a. Adjust closer to complete full closing cycle in less than 4 to 6 seconds without abrupt change of speed between "Sweep" and "Latch" speeds.
    - b. Adjust "Backcheck" according to manufacturer's instructions.
    - c. Set exterior doors closers to have 8.5 lbs maximum pressure to open, interior non-rated at 5 lbs, rated openings at 12 lbs

- B. Maintain ANSI/DHI standard mounting heights for doors, from finished floor to center line of hardware item.

- C. Knox Box: Recessed into wall construction and rigidly anchored in place at locations indicated on Drawings in accordance with requirements for Fire Department access.

3.3 CLEANING

- A. During the course of the Work and on completion, remove and dispose of excess materials, equipment and debris away from premises. Leave Work in clean condition.

3.4 FIELD QUALITY CONTROL

- A. Hardware supplier shall have a certified AHC inspect hardware at fire rated doors (including doors and frames as a unit) and verify compliance with UL 10C (positive pressure testing) as required by current codes for this project. Hardware at fire rated doors which does not comply with code requirements shall be removed and replaced at no additional cost to Owner.

3.5 HARDWARE SCHEDULE

HW SET: 01

EACH TO HAVE:

2	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	ELECTRIC HW HINGE	5BB1HW 4.5 X 4.5 TW8	630	IVE
1	EA	ELEC PANIC DEVICE	LX-RX-LD-99-NL	626	VON
1	EA	SFIC RIM CYLINDER	80-159 GRN	626	SCH
	EA	PERM. CORE	1C7 (GMK, WC KEYWAY)	626	BES
1	EA	CLOSER/ STOP	4040XP CUSH	689	LCN
1	EA	RAIN DRIP	142A	AL	ZER
1	SET	SEALS	188S	BLK	ZER
1	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	656A MSLA-10	AL	ZER
		DR POS. SWITCH	BY SECURITY CONTRACTOR)		

NOTE: LATCH BOLT AND PUSH PAD MONITORED FOR SECURITY.

HW SET: 02

EACH TO HAVE:

6	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
2	EA	MANUAL FLUSH BOLT	FB457	626	IVE
1	EA	STOREROOM LOCK	ND80HD ATH 14-042	626	SCH
1	EA	PERM. CORE	1C7 (GMK, WC KEYWAY)	626	BES
2	EA	CLOSER/ STOP	4040XP CUSH	689	LCN
1	EA	RAIN DRIP	142A	AL	ZER
1	SET	SEALS	188S	BLK	ZER
1	EA	ASTRAGAL SEAL	188S (ONE EDGE - BTWN DOORS)	BLK	ZER
1	EA	ASTRAGAL	43SP	600	ZER
1	EA	THRESHOLD	656A MSLA-10	AL	ZER

HW SET: 03

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	PANIC DEVICE	LD-99-NL	626	VON
1	EA	SFIC RIM CYLINDER	80-159 GRN	626	SCH
1	EA	PERM. CORE	1C7 (GMK, WC KEYWAY)	626	BES
1	EA	CLOSER/ STOP	4040XP CUSH	689	LCN
1	EA	RAIN DRIP	142A	AL	ZER
1	SET	SEALS	188S	BLK	ZER
1	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	656A MSLA-10	AL	ZER
		DR POS. SWITCH	BY SECURITY CONTRACTOR)		

HW SET: 04

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	630	IVE
1	EA	STOREROOM LOCK	ND80HD ATH	626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE DS	630	VON
1	EA	LOCK GUARD	LG14	630	IVE
1	EA	PERM. CORE	1C7 (GMK, WC KEYWAY)	626	BES
1	EA	CLOSER/ STOP	4040XP CUSH	689	LCN
1	EA	RAIN DRIP	142A	AL	ZER
1	SET	SEALS	188S	BLK	ZER
1	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	656A MSLA-10	AL	ZER
		DR POS. SWITCH	BY SECURITY CONTRACTOR)		

NOTE: ELECTRIC STRIKE HAS LATCH SWITCH TO MONITOR DOOR FOR FORCED ENTRY OR DOOR PROPPED OPEN.

HW SET: 05

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	PANIC DEVICE	99-L-F-BE-996-06 (NON-LOCKING)	626	VON
1	EA	CLOSER/ STOP	4040XP CUSH	689	LCN
1	SET	SEALS	188S	BLK	ZER
1	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	545A-MSLA-10	A	ZER

HW SET: 06

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	ND80HD ATH	626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE DS	630	VON
1	EA	PERM. CORE	1C7 (GMK, WC KEYWAY)	626	BES
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	WALL STOP	WS401CVX	626	IVE
3	EA	SILENCER	SR64	GRY	IVE
		DR POS. SWITCH	BY SECURITY CONTRACTOR)		

NOTE: ELECTRIC STRIKE HAS LATCH SWITCH TO MONITOR DOOR FOR FORCED ENTRY OR DOOR PROPPED OPEN.

NOTE: AT IN-SWING DOORS PROVIDE REG ARM CLOSER 4011.

HW SET: 06A

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	ND80HD ATH	626	SCH
1	EA	ELECTRIC STRIKE	6211 FSE DS	630	VON
1	EA	PERM. CORE	1C7 (GMK, WC KEYWAY)	626	BES
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	FLOOR STOP	FS436	626	IVE
3	EA	SILENCER	SR64	GRY	IVE
		DR POS. SWITCH	BY SECURITY CONTRACTOR)		

NOTE: ELECTRIC STRIKE INSTALLED NOW FOR FUTURE CARD READER.

NOTE: ELECTRIC STRIKE HAS LATCH SWITCH TO MONITOR DOOR FOR FORCED ENTRY OR DOOR PROPPED OPEN.

NOTE: AT IN-SWING DOORS PROVIDE REG ARM CLOSER 4011.

HW SET: 07

EACH TO HAVE:

2	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	ELECTRIC HW HINGE	5BB1HW 4.5 X 4.5 TW8	652	IVE
1	EA	ELEC PANIC DEVICE	LX-RX-99-L-NL-07	626	VON
1	EA	SFIC RIM CYLINDER	80-159 GRN	626	SCH
1	EA	ELECTRIC STRIKE	6300 FSE	630	VON
1	EA	PERM. CORE	1C7 (GMK, WC KEYWAY)	626	BES
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	WALL STOP	WS401CVX	626	IVE
3	EA	SILENCER	SR64	GRY	IVE
		DR POS. SWITCH	BY SECURITY CONTRACTOR)		
		CARD READER	BY SECURITY CONTRACTOR		

NOTE: PANIC DEVICE HAS MONITORING FOR FORCED ENTRY OR PROPPED OPEN.

HW SET: 08

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	ND50HD ATH	626	SCH
1	EA	PERM. CORE	1C7 (GMK, WC KEYWAY)	626	BES
1	EA	WALL STOP	WS401CCV	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 09

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	OFFICE LOCK	ND50HD ATH	626	SCH
1	EA	PERM. CORE	1C7 (GMK, WC KEYWAY)	626	BES
1	EA	OH STOP	100S	630	GLY
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 10

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	STOREROOM LOCK	ND80HD ATH	626	SCH
1	EA	PERM. CORE	1C7 (GMK, WC KEYWAY)	626	BES
1	EA	WALL STOP	WS401CVX	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: 10A

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
1	EA	STOREROOM LOCK	ND80HD ATH	626	SCH
1	EA	PERM. CORE	1C7 (GMK, WC KEYWAY)	626	BES
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	WALL STOP	WS401CVX	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

NOTE: AT IN-SWING DOOR PROVIDE CLOSER 4011.

HW SET: 11

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5	652	IVE
1	EA	PRIVACY LOCK	L9040 06A L583-363 L283-722	626	SCH
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	KICK PLATE	8400 10" X 2" LDW B4E	630	IVE
1	EA	WALL STOP	WS401CVX	626	IVE
3	EA	SILENCER	SR65	GRY	IVE

HW SET: 12

EACH TO HAVE:

6	EA	HINGE	5BB1 4.5 X 4.5 NRP	652	IVE
2	EA	MANUAL FLUSH BOLT	FB457	626	IVE
1	EA	STOREROOM LOCK	ND80HD ATH 14-042	626	SCH
1	EA	PERM. CORE	1C7 (GMK, WC KEYWAY)	626	BES
2	EA	OH STOP	450S	630	GLY
2	EA	SILENCER	SR64	GRY	IVE

HW SET: 13

EACH TO HAVE:

3	EA	HINGE	5BB1 4.5 X 4.5	652	IVE
1	EA	PASSAGE SET	ND10S ATH	626	SCH
1	EA	SURFACE CLOSER	4011	689	LCN
1	EA	WALL STOP	WS401CCV	626	IVE

HW SET: 14

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	PANIC HARDWARE	99-L-07	626	VON
1	EA	SFIC RIM CYLINDER	80-159 GRN	626	SCH
1	EA	PERM. CORE	1C7 (GMK, WC KEYWAY)	626	BES
1	EA	AUTO OPERATOR	4642 (SURFACE) TB ARM	689	LCN
2	EA	WALL ACTUATOR KIT	8310-3856WS	630	LCN
2	EA	RECEIVER	8310-865	BLU	LCN
1	EA	FLOOR STOP	FS436	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

NOTE: PANIC DEVICE NEEDS TO BE DOGGED DOWN FOR AUTO. OPERATOR TO BE ACTIVE.

HW SET: 15

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	PANIC DEVICE	99-NL-OP-110WD	626	VON
1	EA	SFIC RIM CYLINDER	80-159 GRN	626	SCH
1	EA	PERM. CORE	1C7 (GMK, WC KEYWAY)	626	BES
1	EA	LONG DOOR PULL	9264F 24" 18" O	630	IVE
1	EA	CLOSER/ HOLD	4040XP HEDA	689	LCN
1	EA	FLOOR STOP	FS436	626	IVE
1	SET	SEALS	188S	BLK	ZER
1	EA	DOOR BOTTOM	360AA6-Z49	AA	ZER

HW SET: 16

EACH TO HAVE:

3	EA	HW HINGE	5BB1HW 4.5 X 4.5 NRP	652	IVE
1	EA	PANIC HARDWARE	99-L-07	626	VON
1	EA	SFIC RIM CYLINDER	80-159 GRN	626	SCH
1	EA	PERM. CORE	1C7 (GMK, WC KEYWAY)	626	BES
1	EA	CLOSER/ HOLD	4040XP HEDA	689	LCN
1	EA	FLOOR STOP	FS436	626	IVE
3	EA	SILENCER	SR64	GRY	IVE

HW SET: G-01

FOR USE ON GATE #(S): G1

EACH TO HAVE:

1	EA	PANIC DEVICE	CD-98-NL-OP-WH	630	VON
1	EA	GREASE	DURALUBE #091091-00		VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	MORTISE CYLINDER	1E74	626	BES
1	EA	DOOR PULL	VR910 NL	630	IVE
1	EA	GATE CLOSER	CA-PFGCS-3300-20 (CALIBRE)	AL	CAL

BALANCE OF HARDWARE BY GATE MFG.

WH AT PANIC DEVICE MEANS WEEP HOLES AT THE BOTTOM OF THE PANIC DEVICE ALUMINUM HOUSING TO ALLOW WATER TO DRIAN OUT.

NOTE TO INSTALLER: AFTER INSTALLATION OF PANIC DEVICE, APPLY DURALUBE GREASE (4 OZ.) TO ALL INTERNAL LATCH HEAD MOVING PARTS TO PREVENT PARTS FROM STICKING. NOTE, ALL INTERNAL PARTS ARE COATED WITH ZINC DICHROMATE TO PREVENT RUST BUT, MUST BE LUBRICATED EACH YEAR BY OWNER TO PREVENT PARTS FROM STICKING. WD40 IS NOT ALLOWED TO BE USED ONLY DURALUBE GREASE.

HW SET: G-02

FOR USE ON GATE #(S): G-2

EACH TO HAVE:

1	EA	PADLOCK	41B722 (FOR CANE BOLT)	626	BES
1	EA	PADLOCK	41B722 (FOR LOCABLE HASP)	626	BES

BALANCE OF HARDWARE BY GATE MFG./ SUPPLIER.

END OF SECTION





## SECTION 08 8000 - GLASS AND GLAZING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Types of glazing included:
  1. Primary float glass.
  2. Heat-treated (tempered) float glass.
  3. Spandrel glass.
  4. Fire-rated glazing.
  5. One-Way Glass.
  6. Insulating units.
  7. Insulated metal glazing panels.

#### 1.3 DEFINITIONS

- A. Manufacturer is used in this Section to refer to a firm that produces primary glass or fabricated glass as defined in the referenced glazing standard.
- B. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use due to causes other than glass breakage and improper practices for maintaining, and cleaning insulating glass. Evidence of failure is the obstruction of vision by dust, moisture, or film on the interior surfaces of glass. Improper practices for maintaining and cleaning glass do not comply with the manufacturer's directions.

#### 1.4 SYSTEM PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems that are produced, fabricated, and installed to withstand normal thermal movement, wind loading, and impact loading (where applicable), without failure including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; and other defects in construction.
- B. Normal thermal movement results from the following maximum change (range) in ambient and surface temperatures acting on glass-framing members and glazing components. Base engineering calculation on materials' actual surface temperatures due to both solar heat gain and nighttime sky heat loss.
  1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.

- B. Samples: For verification purposes of 12-inch-square samples of each type of glass indicated except for clear monolithic glass products, and 12-inch-long samples of each color required (except black) for each type of sealant or gasket exposed to view. Install sealant or gasket sample between two strips of material representative in color of the adjoining framing system.
  - 1. Provide two samples of patterned insulated units (PIG), one with frit on No. 4 surface, one with frit on No. 3 surface.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Glass fabricator shall submit copy of his glass manufacturer's certification for insulating products.
- B. Product certificates signed by glazing materials manufacturers certifying that their products comply with specified requirements.
- C. Sample Warranties: For special warranties.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For glass and other glazing materials to include in Operating and Maintenance Manual specified in Division 01.

#### 1.8 QUALITY ASSURANCE

- A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, except where 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 Glazing Manual."
  - 2. IGMA Publications: TM-3000 "Vertical Glazing Guidelines" and TB-3001 "Sloped Glazing Guidelines."
- B. Safety Glass: Products complying with ANSI Z97.1 and testing requirements of 16 CFR Part 1201 for Category II materials.
  - 1. Subject to compliance with requirements, provide safety glass permanently marked with certification label of Safety Glazing Certification Council (SGCC) or other certification agency acceptable to authorities having jurisdiction.
- C. Fire-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.
- D. Insulating Glass Certification Program: Provide insulating glass units permanently marked either on spacers or at least one component lite of units with appropriate certification label of inspecting and testing agency indicated below:
  - 1. Insulating Glass Certification Council (IGCC).
  - 2. Associated Laboratories, Inc. (ALI).
  - 3. National Certified Testing Laboratories (NCTL).

- E. Glass Fabricator Qualifications: Fabricator of insulating units shall be certified by glass manufacturer.
- F. Glazier Qualifications: Engage an experienced glazier who has completed glazing similar in material, design, and extent to that indicated for Project with a record of successful in-service performance.
- G. Single-Source Responsibility for Glass: Obtain glass from one source for each product indicated below:
  - 1. Primary glass of each (ASTM C 1036) type and class indicated.
  - 2. Heat-treated glass of each (ASTM C 1048) condition indicated.
  - 3. Spandrel glazing.
  - 4. Fire-rated glazing product.
  - 5. Insulating glass of each construction indicated.
- H. Single-Source Responsibility for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.
- I. Pre-Installation Conference: Conduct conference at Project site to comply with requirements of Section 01 3119 "Project Meetings."

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials to comply with manufacturer's directions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
  - 1. Where insulating glass units will be exposed to substantial altitude changes, comply with insulating glass fabricator's recommendations for venting and sealing to avoid hermetic seal ruptures.

#### 1.10 PROJECT CONDITIONS

- A. Environmental Conditions: Do not proceed with glazing when ambient and substrate temperature conditions are outside the limits permitted by glazing materials manufacturer or when glazing channel substrates are wet from rain, frost, condensation, or other causes.
  - 1. Install liquid sealants at ambient and substrate temperatures above 40 deg F.

#### 1.11 WARRANTY

- A. General: Warranties specified in this Article shall not deprive the Owner of other rights the Owner may have under other provisions of the Contract Documents and will be in addition to and run concurrent with other warranties made by the Contractor under requirements of the Contract Documents.

- B. Manufacturer's Warranty on Insulating Glass: Submit written warranty signed by manufacturer of insulating glass agreeing to furnish replacements for insulating glass units that deteriorate as defined in "Definitions" article, f.o.b. point of manufacture, freight allowed Project site, within specified warranty period indicated below. Warranty covers only deterioration due to normal conditions of use and not to handling, installing, protecting, and maintaining practices contrary to glass manufacturer's published instructions.
1. Warranty Period: Manufacturer's standard but not less than 10 years after date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide products of one of the following manufacturers:
1. Manufacturers of Clear Float Glass:
    - a. AGC Glass Company North America, Inc.
    - b. Guardian Industries Corp.
    - c. Pilkington.
    - d. PPG Industries, Inc.
    - e. Saint-Gobain Corporation.
  2. Manufacturers of Fire-Rated Glass:
    - a. Safti First.
    - b. Schott North America, Inc.
    - c. Technical Glass Products.
    - d. Vetrotech Saint-Gobain.
  3. Fabricators:
    - a. Oldcastle BuildingEnvelope.
    - b. Viracon, Inc.
    - c. Interpane.

### 2.2 PRIMARY FLOAT GLASS PRODUCTS

- A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Class as indicated below, and Quality q3 (glazing select).
1. Class 1 (clear). **(CG)**
  2. Class 2 (tinted). **(TG)**
- B. Refer to requirements for sealed insulating glass units for performance characteristics of assembled units composed of tinted glass, coated or uncoated, relative to visible light transmittance, U-values, shading coefficient, and visible reflectance.

### 2.3 HEAT-TREATED FLOAT GLASS PRODUCTS, GENERAL

- A. Fabrication Process: By vertical (tong-held) or horizontal (roller-hearth) process, at manufacturer's option, except provide horizontal process where indicated as tongless or free of tong marks.

2.4 HEAT-TREATED FLOAT GLASS (**CTG, TTG**)

- A. Uncoated, Clear, Heat-Treated Float Glass: ASTM C 1048, Condition A (uncoated surfaces), Type I (transparent glass, flat), Class 1 (clear) or Class 2 (tinted) as indicated, Quality q3 (glazing select), 6 mm thick, kind as indicated below.
  - 1. Kind HS (heat strengthened) where indicated.
  - 2. Kind FT (fully tempered) where indicated.
- B. Manufacturers: Provide heat-treated glass by manufacturer of clear float glass listed above.

2.5 COATED FLOAT GLASS

- A. High-Performance Coatings: Low-E (low emissivity) type.

2.6 SPANDREL GLASS PRODUCTS (**SG**)

- A. Ceramic-Coated Spandrel Glass: ASTM C 1048, Type I, Condition B, Quality-Q3.
  - 1. Ceramic Frit Color: White.

2.7 FIRE-RATED GLAZING PRODUCTS (**FRG**)

- A. Laminated Ceramic Glazing Material: Proprietary product in the form of two lites of clear ceramic glazing material laminated together to produce a laminated lite of 5/16-inch nominal thickness; polished on both surfaces; weighing 4 lb/sq. ft.; and as follows:
  - 1. Fire-Protection Rating: As indicated for the assembly in which the glazing material is installed, and permanently labeled by a testing and inspecting agency acceptable to authorities having jurisdiction.
  - 2. Polished on both surfaces, transparent.
  - 3. Product: Subject to compliance with requirements, provide "FireLite Plus" manufactured by Nippon Electric Glass Co., Ltd. and distributed by Technical Glass Products.

2.8 ONE-WAY GLASS

- A. Magnetically sputter vacuum deposition between 2 layers of 1/4 inch clear glazing. Subject side facing courtrooms.

2.9 INSULATING GLASS PRODUCTS (**TIG, TTIG, SIG**)

- A. Sealed Insulating Glass Units: Preassembled units consisting of organically sealed lites of glass separated by dehydrated air spaces complying with ASTM E 2190 and with other requirements indicated.
  - 1. For properties of individual glass lites making up units, refer to requirements specified elsewhere in this Section applicable to types, classes, kinds, and conditions of glass products comprising lites of insulating glass units.
  - 2. Provide float glass or heat-treated float glass of kind indicated or, if not otherwise indicated, Kind HS (heat strengthened) where recommended by manufacturer to comply with system performance requirements specified and Kind FT (fully tempered) where safety glass is designated or required.

3. Performance characteristics designated for insulating glass are nominal values based on manufacturer's published test data for units with lites 6 mm thick and nominal 1/2-inch dehydrated space between lites, unless otherwise indicated.
4. U-values are expressed as Btu/hr x sq. ft. x deg F.

## 2.10 INSULATING METAL GLAZING PANELS (IMG)

- A. Glazing Panels: Citadel "GlazeGuard 1000" composite opaque glazing panel, 1-inch thick, fabricated as follows:
1. Composition: Two prefinished aluminum skins laminated to substrates of tempered hardboard. These stabilizers surround a core of polystyrene (EPS) or isocyanurate (ISO) foam.
    - a. Aluminum Face Sheet: Thickness 0.024-inch.
    - b. Texture: Smooth.
    - c. Tempered Hardboard Stabilizers: 1/8-inch.
    - d. Foam Core: 11/16-inch thick,
    - e. Panel Weight: 2.08 lbs./sq. ft.
    - f. Finish: Clear satin anodized.
    - g. Similar panels by Mapes are also acceptable.

## 2.11 ELASTOMERIC GLAZING SEALANTS

- A. General: Provide products of type indicated, complying with the following requirements:
1. Compatibility: Select glazing sealants and tapes of proven compatibility with other materials they will contact, including glass products, seals of insulating glass units, and glazing channel substrates, under conditions of installation and service, as demonstrated by testing and field experience.
  2. Suitability: Comply with sealant and glass manufacturer's recommendations for selecting glazing sealants and tapes that are suitable for applications indicated and conditions existing at time of installation.
  3. Colors: Provide color of exposed joint sealants to comply with the following:
    - a. Provide selections made by Architect from manufacturer's full range of standard colors for products of type indicated.
- B. Elastomeric Glazing Sealant Standard: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with ASTM C 920 requirements indicated below:
1. Two-Part Polysulfide Glazing Sealant: Type M; Grade NS; Class 25; Uses NT, M, G, A, and, as applicable to uses indicated, O.
  2. One-Part Acid-Curing Silicone Glazing Sealant: Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to uses indicated, O.
  3. One-Part Non-Acid-Curing Silicone Glazing Sealant: Type S; Grade NS, Class 25; Uses NT, G, A, and, as applicable to uses indicated, O; and complying with the following requirements for modulus and additional joint movement capability.
    - a. Medium Modulus: Tensile strength of not less than 45 nor more than 75 psi at 100 percent elongation when tested per ASTM D 412 after 14 days at 77 deg F and 50 percent relative humidity.

- b. Additional capability, when tested per ASTM C 719 for adhesion and cohesion under maximum cyclic movement, to withstand the following percentage increase and decrease of joint width, as measured at time of application, and remain in compliance with other requirements of ASTM C 920: 50 percent.

## 2.12 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent, nonstaining and nonmigrating in contact with nonporous surfaces, with or without spacer rod as recommended by tape and glass manufacturers for application indicated, packaged on rolls with a release paper backing, and complying with AAMA 800 for products indicated below:
  1. AAMA 804.1.
- B. Expanded Cellular Glazing Tape: Closed-cell, polyvinyl chloride foam tape, factory coated with adhesive on both surfaces, packaged on rolls with release liner protecting adhesive, and complying with AAMA 800 for product 810.5.
- C. Products: Subject to compliance with requirements, provide one of the following:
  1. Back-Bedding Mastic Glazing Tape Without Spacer Rod:
    - a. PTI 303 Glazing Tape (shimless), Protective Treatments, Inc.
    - b. Tremco 440 Tape, Tremco Inc.
    - c. Extru-Seal, Pecora Corp.
  2. Back-Bedding Mastic Glazing Tape With Spacer Rod:
    - a. PTI 303 Glazing Tape (with shim), Protective Treatments, Inc.
    - b. Pre-shimmed Tremco 440 Tape, Tremco, Inc.
    - c. PTI 606 Architectural Sealant Tape, Protective Treatments, Inc.
  3. Expanded Cellular Glazing Tape:
    - a. Norseal V-980 Closed-Cell Glazing Tape, Norton Company.

## 2.13 GLAZING GASKETS

- A. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock strips, complying with ASTM C 542, black.
- B. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
  1. Neoprene, ASTM C 864.
  2. EPDM, ASTM C 864.
  3. Silicone, ASTM C 1115.
- C. Soft Compression Gaskets: Extruded or molded closed-cell, integral-skinned gaskets of material indicated below, complying with ASTM C 509, Type II, black, and of profile and hardness required to maintain watertight seal:
  1. Neoprene.
  2. EPDM.
  3. Silicone.

- D. Manufacturers: Subject to compliance with requirements, provide products by one of the following companies.
1. Lock-Strip Gaskets:
    - a. Stanlock Div., Griffith Rubber Mills.
  2. Preformed Gaskets:
    - a. Advanced Elastomer Systems, L.P.
    - b. Schnee-Morehead, Inc.
    - c. Tremco, Inc.

#### 2.14 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 involved for glazing application indicated, and with a proven record of compatibility with surfaces contacted in installation.
- B. Cleaners, Primers and Sealers: Type recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85 plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer 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. Plastic Foam Joint Fillers: Preformed, compressible, resilient, nonstaining, nonextruding, nonoutgassing, strips of closed-cell plastic foam of density, size, and shape to control sealant depth and otherwise contribute to produce optimum sealant performance.

#### 2.15 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.
- B. Clean cut or flat grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine glass framing, with glazier present, for compliance with the following:
1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
  2. Presence and functioning of weep system.
  3. Minimum required face or edge clearances.
  4. Effective sealing between joints of glass-framing members.

- B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

### 3.3 GLAZING, GENERAL

- A. Comply with combined recommendations of manufacturers of glass, sealants, gaskets, and other glazing materials, except where more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions as indicated on Drawings provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass from edge damage during handling and installation. Remove damaged glass from Project site and legally dispose of off site. Damaged glass is glass with edge damage or other imperfections that, when installed, weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install elastomeric setting blocks in sill rabbets, sized and located to comply with referenced glazing standard, 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 sizes larger than 50 united inches (length plus height) as follows:
  - 1. Locate spacers inside, outside, and directly opposite each other. Install correct size and spacing to preserve required face clearances, except where gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and comply with system performance requirements.
  - 2. Provide 3-mm (1/8-inch) 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 to comply with requirements of referenced glazing publications, unless otherwise required by glass manufacturer.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

- K. Square cut wedge-shaped gaskets at corners and install gaskets in 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 in one continuous length. Do not stretch tapes to make them fit opening.
- C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
- 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 just before each lite is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

#### 3.5 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Secure compression gaskets in place with joints located at corners to compress gaskets producing a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- C. Install gaskets so they protrude past face of glazing stops.

#### 3.6 SEALANT GLAZING (WET)

- A. Install continuous spacers between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel weep systems until sealants cure. Secure spacers 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. Install pressurized gaskets to protrude slightly out of channel to eliminate dirt and moisture pockets.

### 3.7 LOCK-STRIP GASKET GLAZING

- A. Comply with ASTM C 716 and gasket manufacturer's printed recommendations. Provide supplementary wet seal and weep system unless otherwise indicated.

### 3.8 PROTECTION AND CLEANING

- A. Protect exterior glass from breakage 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 including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended 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 build-up of dirt, scum, alkali deposits, or stains, and remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents and vandalism, during construction period.
- E. Wash glass on both faces in each area of Project not more than 4 days prior to date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

### 3.9 GLAZING SCHEDULE

**CG:** Clear float glass meeting requirements of article 2.2. Minimum 1/4-inch (6mm) thick.

**CTG:** Clear tempered (heat-treated) glass meeting requirements of article 2.4. Minimum 1/4-inch (6mm) thick.

**FRG:** Fire rated glass meeting requirements of Article 2.7.

**OWG:** One-Way glass meeting requirements of article 2.8. Overall system thickness: 1-inch.

**TIG:** Tinted insulating glass meeting requirements of Article 2.9 and comprised of the following components with Low-E coating (Solarban 60) on #2 surface:

Exterior Pane: Tinted (solargray) float glass (TG)

1/2-inch airspace (dark bronze)

Interior Pane: Clear float glass (CG)

Overall System Thickness: 1 inch.

Nominal Performance Characteristics:

Visible Light Transmittance (VLT): 35%

Shading Coefficient (SC): 29%

Summer Daytime U-Value: 0.27

Light to Solar Gain (LSG): 1.40

**TTIG:** Tinted tempered insulating glass meeting requirements of article 2.9 and comprised of the following components with Low-E coating (Solarban 60) on #2 surface:

Exterior Pane: Tinted (solargray) tempered glass (TG)

1/2-inch airspace (dark bronze)

Interior Pane: Clear tempered glass (CTG)

Overall System Thickness: 1 inch.

Nominal Performance Characteristics:

Visible Light Transmittance (VLT): 35%

Shading Coefficient (SC): 29%

Summer Daytime U-Value: 0.27

Light to Solar Gain (LSG): 1.40

TTIG shall be installed where indicated in Drawings and where required by Code for safety glass.

**IMG:** Insulated metal glazing units meeting requirements of article 2.10. Unit thickness to be 1-inch nominal.

END OF SECTION

## SECTION 08 9119 - FIXED LOUVERS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Fixed, extruded-aluminum louvers.

#### 1.3 DEFINITIONS

- A. Louver Terminology: Definitions of terms for metal louvers contained in AMCA 501 apply to this Section unless otherwise defined in this Section or in referenced standards.
- B. Horizontal Louver: Louver with horizontal blades (i.e., the axes of the blades are horizontal).
- C. Vertical Louver: Louver with vertical blades (i.e., the axes of the blades are vertical).
- D. Drainable-Blade Louver: Louver with blades having gutters that collect water and drain it to channels in jambs and mullions, which carry it to bottom of unit and away from opening.
- E. Wind-Driven-Rain-Resistant Louver: Louver that provides specified wind-driven rain performance, as determined by testing according to AMCA 500-L.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. For louvers specified to bear AMCA seal, include printed catalog pages showing specified models with appropriate AMCA Certified Ratings Seals.
- B. Shop Drawings: For louvers and accessories. Include plans, elevations, sections, details, and attachments to other work. Show frame profiles and blade profiles, angles, and spacing.
  - 1. Show weep paths, gaskets, flashing, sealant, and other means of preventing water intrusion.
  - 2. Show mullion profiles and locations.
- C. Samples: For each type of metal finish required.

1.5 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Based on evaluation of comprehensive tests performed according to AMCA 500-L by a qualified testing agency or by manufacturer and witnessed by a qualified testing agency, for each type of louver and showing compliance with performance requirements specified.

1.6 QUALITY ASSURANCE

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

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify actual dimensions of openings by field measurements before fabrication.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain louvers from single source from a single manufacturer where indicated to be of same type, design, or factory-applied color finish.

2.2 PERFORMANCE REQUIREMENTS

- A. Structural Performance: Louvers shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated without permanent deformation of louver components, noise or metal fatigue caused by louver-blade rattle or flutter, or permanent damage to fasteners and anchors. Wind pressures shall be considered to act normal to the face of the building.
  - 1. Wind Loads: Determine loads based on pressures as indicated on Drawings.
- B. Louver Performance Ratings: Provide louvers complying with requirements specified, as demonstrated by testing manufacturer's stock units identical to those provided, except for length and width according to AMCA 500-L.
- C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
  - 1. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
- D. SMACNA Standard: Comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" for fabrication, construction details, and installation procedures.

## 2.3 FIXED, EXTRUDED-ALUMINUM LOUVERS

### A. Horizontal, Drainable-Blade Louver:

1. Basis-of-Design Product: Subject to compliance with requirements, provide Greenheck Fan Corporation; EDD-601 or a comparable product by one of the following:
  - a. Construction Specialties, Inc.
  - b. Nystrom, Inc.
  - c. Ruskin Company.
2. Louver Depth: 6 inches.
3. Frame and Blade Nominal Thickness: Not less than 0.080 inch.
4. Mullion Type: Exposed.
5. Louver Performance Ratings:
  - a. Free Area: Not less than 8.0 sq. ft for 48-inch-wide by 48-inch-high louver.
  - b. Point of Beginning Water Penetration: Not less than 1100 fpm.
  - c. Air Performance: Not more than 0.10-inch wg static pressure drop at 750-fpm free-area intake velocity.
6. AMCA Seal: Mark units with AMCA Certified Ratings Seal.

## 2.4 LOUVER SCREENS

### A. General: Provide screen at each exterior louver.

1. Screen Location for Fixed Louvers: Interior face.
2. Screening Type: Bird screening.

### B. Secure screen frames to louver frames with stainless-steel machine screws, spaced a maximum of 6 inches from each corner and at 12 inches o.c.

### C. Louver Screen Frames: Fabricate with mitered corners to louver sizes indicated.

1. Metal: Same type and form of metal as indicated for louver to which screens are attached. Reinforce extruded-aluminum screen frames at corners with clips.
2. Finish: Same finish as louver frames to which louver screens are attached.
3. Type: Non-rewirable, U-shaped frames.

### D. Louver Screening for Aluminum Louvers:

1. Bird Screening: Flattened, expanded aluminum, 3/4 by 0.050 inch thick.

## 2.5 MATERIALS

### A. Aluminum Extrusions: ASTM B 221, Alloy 6063-T5, T-52, or T6.

### B. Aluminum Sheet: ASTM B 209, Alloy 3003 or 5005 with temper as required for forming, or as otherwise recommended by metal producer for required finish.

### C. Fasteners: Use types and sizes to suit unit installation conditions.

1. Use hex-head or Phillips pan-head screws for exposed fasteners unless otherwise indicated.
2. For fastening aluminum, use aluminum or 300 series stainless-steel fasteners.
3. For color-finished louvers, use fasteners with heads that match color of louvers.

- D. Postinstalled Fasteners for Concrete and Masonry: Torque-controlled expansion anchors, made from stainless-steel components, with capability to sustain, without failure, a load equal to 4 times the loads imposed, for concrete, or 6 times the load imposed for masonry, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

## 2.6 FABRICATION

- A. Factory assemble louvers to minimize field splicing and assembly. Disassemble units as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.
- B. Vertical Assemblies: Where height of louver units exceeds fabrication and handling limitations, fabricate units to permit field-bolted assembly with close-fitting joints in jambs and mullions, reinforced with splice plates.
  - 1. Continuous Vertical Assemblies: Fabricate units without interrupting blade-spacing pattern unless horizontal mullions are indicated.
- C. Maintain equal louver blade spacing to produce uniform appearance.
- D. Fabricate frames, including integral sills, to fit in openings of sizes indicated, with allowances made for fabrication and installation tolerances, adjoining material tolerances, and perimeter sealant joints.
  - 1. Frame Type: Exterior flange unless otherwise indicated.
- E. Include supports, anchorages, and accessories required for complete assembly.
  - 1. Exterior Corners: Prefabricated corner units with mitered and welded blades and with fully recessed mullions at corners.
- F. Provide extended sills for recessed louvers.
- G. Join frame members to each other and to fixed louver blades with fillet welds concealed from view unless otherwise indicated or size of louver assembly makes bolted connections between frame members necessary.

## 2.7 ALUMINUM FINISHES

- A. Finish louvers after assembly.
- B. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 and containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
  - 1. Color and Gloss: As selected by Architect from manufacturer's full range.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

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

#### 3.2 PREPARATION

- A. Coordinate setting drawings, diagrams, templates, instructions, and directions for installation of anchorages that are to be embedded in concrete or masonry construction. Coordinate delivery of such items to Project site.

#### 3.3 INSTALLATION

- A. Locate and place louvers level, plumb, and at indicated alignment with adjacent work.
- B. Use concealed anchorages where possible. Provide brass or lead washers fitted to screws where required to protect metal surfaces and to make a weathertight connection.
- C. Form closely fitted joints with exposed connections accurately located and secured.
- D. Provide perimeter reveals and openings of uniform width for sealants and joint fillers, as indicated.
- E. Protect unpainted galvanized and nonferrous-metal surfaces that are in contact with concrete, masonry, or dissimilar metals from corrosion and galvanic action by applying a heavy coating of bituminous paint or by separating surfaces with waterproof gaskets or nonmetallic flashing.
- F. Install concealed gaskets, flashings, joint fillers, and insulation as louver installation progresses, where weathertight louver joints are required. Comply with Section 079200 "Joint Sealants" for sealants applied during louver installation.

#### 3.4 ADJUSTING AND CLEANING

- A. Clean exposed louver surfaces that are not protected by temporary covering, to remove fingerprints and soil during construction period. Do not let soil accumulate during construction period.
- B. Before final inspection, clean exposed surfaces with water and a mild soap or detergent not harmful to finishes. Thoroughly rinse surfaces and dry.
- C. Restore louvers damaged during installation and construction so no evidence remains of corrective work. If results of restoration are unsuccessful, as determined by Architect, remove damaged units and replace with new units.

1. Touch up minor abrasions in finishes with air-dried coating that matches color and gloss of, and is compatible with, factory-applied finish coating.

END OF SECTION

SECTION 09 2116 - GYPSUM BOARD ASSEMBLIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
  1. Steel framing members to receive gypsum board.
  2. Interior gypsum wallboard.
  3. Exterior gypsum sheathing.
  4. Cementitious backer units.

1.3 DEFINITIONS

- A. Gypsum Board Construction Terminology: Refer to ASTM C 11 for definitions of terms related to gypsum board assemblies not defined in this Section or in other referenced standards.

1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  1. Studs and Runners: Provide documentation that framing members' certification is according to SIFA's "Code Compliance Certification Program for Cold-Formed Steel Structural and Non-Structural Framing Members."
- B. Texture samples 12" x 12" for each texture specified.

1.5 INFORMATIONAL SUBMITTALS

- A. Evaluation Reports: For firestop tracks, from ICC-ES or other qualified testing agency acceptable to authorities having jurisdiction.

1.6 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Where fire-rated gypsum board assemblies are indicated, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by an independent testing and inspecting agency acceptable to authorities having jurisdiction.
  1. Fire Resistance Ratings: As indicated by reference to GA File Numbers in GA-600 "Fire Resistance Design Manual" or to design designations in UL "Fire Resistance Directory" or in the listing of another testing and inspecting agency acceptable to authorities having jurisdiction.

- B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
- C. Single-Source Responsibility for Steel Framing: Obtain steel framing members for gypsum board assemblies from a single manufacturer.
- D. Single-Source Responsibility for Panel Products: Obtain each type of gypsum board and other panel products from a single manufacturer.
- E. Single-Source Responsibility for Finishing Materials: Obtain finishing materials from either the same manufacturer that supplies gypsum board and other panel products or from a manufacturer acceptable to gypsum board manufacturer.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, or bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum panels flat to prevent sagging.
- C. Handle gypsum board to prevent damage to edges, ends, and surfaces. Do not bend or otherwise damage metal corner beads and trim.

#### 1.8 PROJECT CONDITIONS

- A. Environmental Conditions, General: Establish and maintain environmental conditions for applying and finishing gypsum board to comply with ASTM C 840 and with gypsum board manufacturer's recommendations.
- B. Room Temperatures: For nonadhesive attachment of gypsum board to framing, maintain not less than 40 deg F. For adhesive attachment and finishing of gypsum board, maintain not less than 50 deg F for 48 hours prior to application and continuously after until dry. Do not exceed 95 deg F when using temporary heat sources.
- C. Ventilation: Ventilate building spaces, as required, for drying joint treatment materials. Avoid drafts during hot dry weather to prevent finishing materials from drying too rapidly.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Metal Framing:
    - a. CEMCO; California Expanded Metal Products Co.
    - b. MBA Building Supplies.
    - c. MRI Steel Framing, LLC.

- d. Phillips Manufacturing Co.
- e. Steel Network, Inc. (The).
- f. Telling Industries.
2. Grid Suspension Assemblies:
  - a. Armstrong World Industries.
  - b. Chicago Metallic Corp.
  - c. USG Corporation.
3. Gypsum Board and Related Products:
  - a. American Gypsum.
  - b. CertainTeed Corporation.
  - c. Georgia-Pacific Building Products.
  - d. National Gypsum Company.
  - e. PABCO Gypsum.
  - f. Temple-Inland Building Products by Georgia-Pacific.
  - g. USG.

## 2.2 STEEL FRAMING COMPONENTS FOR SUSPENDED AND FURRED CEILINGS

- A. General: Comply with ASTM C 754 for conditions indicated.
- B. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper.
- C. Hanger Rods: ASTM A 510 mild carbon steel and zinc-coated or protected with rust-inhibitive paint.
- D. Flat Hangers: Mild steel and zinc-coated or protected with rust-inhibitive paint.
- E. Angle Hangers: Angles with legs not less than 7/8 inch wide, formed from 0.0635-inch-thick galvanized steel sheet complying with ASTM A 653 Coating Designation G60, with bolted connections and 5/16-inch-diameter bolts.
- F. Channels: Cold-rolled steel, 0.0538-inch-minimum thickness of base (uncoated) metal and 7/16-inch-wide flanges, and as follows:
  1. Carrying Channels: 2 inches deep, 590 lb per 1000 feet, unless otherwise indicated.
  2. Furring Channels: 3/4 inch deep, 300 lb per 1000 feet, unless otherwise indicated.
  3. Finish: G-60 hot-dip galvanized coating per ASTM A 653 for framing for exterior soffits and where indicated.
- G. Steel Studs for Furring Channels: ASTM C 645, with flange edges bent back 90 deg and doubled over to form 3/16-inch minimum lip (return), minimum thickness of base (uncoated) metal and minimum depth as follows:
  1. Thickness: 0.0179 inch, unless otherwise indicated.
  2. Depth: 3-5/8 inches, unless otherwise indicated.
  3. Protective Coating: G40 hot-dip galvanized coating per ASTM A 653 for framing for exterior soffits and ceiling suspension members in areas within 10 feet of exterior walls.
- H. Steel Rigid Furring Channels: ASTM C 645, hat-shaped, depth of 7/8 inch, and minimum thickness of base (uncoated) metal as follows:
  1. Thickness: 0.0179 inch, unless otherwise indicated.

2. Protective Coating: G40 hot-dip galvanized coating per ASTM A 653 for framing for exterior soffits and ceiling suspension members in areas within 10 feet of exterior walls.
- I. Resilient Furring Channels: 1/2-inch-deep, steel sheet members designed to reduce sound transmission.
  1. Configuration: Asymmetrical.
- J. Grid Suspension System for Interior Ceilings: ASTM C 645, manufacturer's standard direct-hung grid suspension system composed of main beams and cross furring members that interlock to form a modular supporting network.

2.3 STEEL FRAMING FOR WALLS AND PARTITIONS

- A. Steel Studs and Runners: ASTM C 645, with flange edges of studs bent back 90 degrees and doubled over to form 3/16-inch-wide minimum lip (return) and complying with the following SSMA requirements for interior, non-load-bearing steel studs in gypsum wallboard walls (5 PSF, L/240, non-composite):

STUD SIZE	MAXIMUM HEIGHT, FEET			DESIGN BASED ON SSMA SIZE
	SPACING, INCHES			
	12	16	24	
3-5/8" x 25 gauge	13'-8"	12'-5"	10'-10"	350S125-18
3-5/8" x 20 gauge	18'-5"	16'-9"	14'-7"	362S137-33
6" x 20 gauge	27'-5"	24'-11"	21'-9"	600S137-33
8" x 20 gauge	34'-8"	31'-6"	27'-6"	800S137-33

(SSMA = Steel Stud Manufacturer's Association)

1. Provide metal floor and ceiling runners designed to accommodate the specified studs.
  2. Minimum 20 gauge stud for typical interior partitions supporting fixtures, millwork, or other permanent building elements.
  3. Use of EQ coatings on studs is not acceptable.
  4. If using EQ or equivalent studs, studs to be minimum 20 gauge. Blocking, support, accessories, and installation shall be per manufacturer's written instructions and as required to meet ASTM C 754.
- B. Steel Rigid Furring Channels: ASTM C 645, hat-shaped, depth and minimum thickness of base (uncoated) metal as follows:
    1. Depth: 7/8 inch.
    2. Depth: 1-1/2 inch.
    3. Minimum Base Metal Thickness: 0.0179 inch, unless otherwise indicated.
  - C. Furring Brackets: Serrated-arm type, adjustable, fabricated from corrosion-resistant steel sheet complying with ASTM C 645, minimum thickness of base (uncoated) metal of 0.0329 inch, designed for screw attachment to steel studs and steel rigid furring channels used for furring.

- D. Fasteners for Metal Framing: Provide fasteners of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel framing and furring members securely to substrates involved; complying with the recommendations of gypsum board manufacturers for applications indicated.

2.4 CEILING JOIST FRAMING

- A. Steel Ceiling Joists: Manufacturer's standard C-shaped steel sections, of web depths indicated, unpunched, with stiffened flanges, and as follows:
1. Provide ceiling joists as required for spans indicated below (6 PSF, L/240, non-composite):

JOIST SIZE	MAXIMUM HEIGHT, FEET			DESIGN BASED ON SSMA SIZE
	SPACING, INCHES			
	12	16	24	
3-5/8" x 25 gauge	8'-3"	7'-6"	6'-8"	350S125-18
3-5/8" x 20 gauge	10'-1"	9'-4"	8'-4"	362S137-33
6" x 20 gauge	11'-10"	11'-0"	9'-10"	600S137-33

2.5 GYPSUM BOARD PRODUCTS

- A. General: Provide gypsum board of types indicated in maximum lengths available to minimize end-to-end butt joints. Products comply with ASTM C 1396 requirements.
1. Thickness: Provide gypsum board in 5/8 inch thickness to comply with ASTM C 840 for application system and support spacing indicated.
- B. Gypsum Wallboard:
1. Type: Type X.
  2. Edges: Tapered.
  3. Thickness: 5/8 inch unless shown otherwise.
  4. **NOTE:** At locations where radiused construction is shown, use 1/4-inch and 3/8-inch-thick units.
- C. Moisture- and Mold-Resistant Gypsum Board: ASTM C1396 and as follows:
1. Type: Regular, unless shown otherwise.
  2. Thickness: 5/8 inch, unless shown otherwise.
  3. Long Edges: Tapered.
  4. Mold Resistance: ASTM D3273, score of 10 as rated according to ASTM D3274.
- D. Gypsum Sheathing Board: Gypsum sheathing board 1/2-inch or 5/8-inch thick, as shown, consisting of noncombustible gypsum core incorporating a water-resistant material surfaced on face, back and long edges with water-repellent paper bonded to the core.
- E. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325, in maximum lengths available to minimize end-to-end butt joints. Contractor's option to install cementitious backer units for locations having ceramic tile finish instead of moisture- and mold- resistant gypsum board listed above.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Custom Building Products; Wonderboard.

- b. USG Corporation; DUROCK Cement Board.
- 2. Thickness: 5/8 inch.

- F. Exterior Gypsum Sheathing: ASTM C 1177/1177M and as follows:
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Georgia-Pacific Building Products; Dens-Glass Gold.
    - b. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.
    - c. United States Gypsum Company; Securock.

## 2.6 TRIM ACCESSORIES

- A. Accessories for Interior Installation: Corner beads, edge trim, and control joints complying with ASTM C 1047 and requirements indicated below:
  - 1. Material: Formed metal, plastic, or metal combined with paper, with metal complying with the following requirement:
    - a. Sheet steel zinc-coated by hot-dip process.
    - b. Sheet steel coated with zinc by hot-dip or electrolytic processes, or with aluminum or rolled zinc.
  - 2. Shapes indicated below by reference to Fig. 1 designations in ASTM C 1047:
    - a. Cornerbead on outside corners.
    - b. LC-bead with both face and back flanges; face flange formed to receive joint compound.
    - c. L-bead with face flange only; face flange formed to receive joint compound.
    - d. U-bead with face and back flanges; face flange formed to be left without application of joint compound.
    - e. One-piece control joint formed with V-shaped slot, with removable strip covering slot opening.
    - f. Aluminum soffit vent similar to Fry Reglet Corp. DS-875-5/8-V-300 (coordinate with Detail).
    - g. F-Shape reveal formed of galvanized metal in single piece similar to Fry Reglet Corp. F Reveal Molding DRML-50-50.

## 2.7 JOINT TREATMENT MATERIALS

- A. General: Provide joint treatment materials complying with ASTM C 475 and the recommendations of both the manufacturers of sheet products and of joint treatment materials for each application indicated.
- B. Joint Tape for Gypsum Board: Paper reinforcing tape, unless otherwise indicated.
  - 1. Use pressure-sensitive or staple-attached open-weave glass-fiber reinforcing tape with compatible joint compound at cementitious backer units and where recommended by manufacturer of gypsum board and joint treatment materials for application indicated.
- C. Drying-Type Joint Compounds for Gypsum Board: Factory-packaged vinyl-based products complying with the following requirements for formulation and intended use.
  - 1. Ready-Mixed Formulation: Factory-mixed product.
  - 2. Job-Mixed Formulation: Powder product for mixing with water at Project site.
  - 3. Taping compound formulated for embedding tape and for first coat over fasteners and face flanges of trim accessories.

4. Topping compound formulated for fill (second) and finish (third) coats.
5. All-purpose compound formulated for both taping and topping compounds.

## 2.8 MISCELLANEOUS MATERIALS

- A. General: Provide auxiliary materials for gypsum board construction that comply with referenced standards and recommendations of gypsum board manufacturer.
- B. Spot Grout: ASTM C 475, setting-type joint compound recommended for spot grouting hollow metal door frames.
- C. Steel drill screws complying with ASTM C 1002 for the following applications:
  1. Fastening gypsum board to steel members less than 0.03 inch thick.
  2. Fastening gypsum board to wood members.
  3. Fastening gypsum board to gypsum board.
- D. Steel drill screws complying with ASTM C 954 for fastening gypsum board to steel members from 0.033 to 0.112 inch thick.

## 2.9 TEXTURE FINISH PRODUCTS

- A. Primer: Of type recommended by texture finish manufacturer.
- B. Aggregate Finish: Factory-packaged proprietary drying-type powder product formulated with aggregate for mixing with water at Project site for spray application to produce texture indicated below:
  1. Match existing.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates to which gypsum board assemblies attach or abut, installed hollow metal frames, cast-in-anchors, and structural framing with Installer present for compliance with requirements for installation tolerances and other conditions affecting performance of assemblies specified in this Section. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Ceiling Anchorages: Coordinate installation of ceiling suspension systems with installation of overhead structural assemblies to ensure that inserts and other provisions for anchorages to building structure have been installed to receive ceiling hangers that will develop their full strength and at spacing required to support ceilings.

### 3.3 INSTALLING STEEL FRAMING, GENERAL

- A. Steel Framing Installation Standard: Install steel framing to comply with ASTM C 754 and with ASTM C 840 requirements that apply to framing installation.

- B. Install supplementary framing, blocking, and bracing at terminations in gypsum board assemblies to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction. Comply with details indicated and with recommendations of gypsum board manufacturer or, if none available, with "Gypsum Construction Handbook" published by United States Gypsum Co.
- C. Isolate steel framing from building structure at locations indicated to prevent transfer of loading imposed by structural movement. Comply with details shown on Drawings.
  - 1. Where building structure abuts ceiling perimeter or penetrates ceiling.
  - 2. Where partition framing and wall furring abut structure except at floor.
    - a. Provide slip- or cushioned-type joints as detailed to attain lateral support and avoid axial loading.
- D. Do not bridge building expansion and control joints with steel framing or furring members. Independently frame both sides of joints with framing or furring members as indicated.

### 3.4 INSTALLING STEEL FRAMING FOR SUSPENDED AND FURRED CEILINGS

- A. Suspend ceiling hangers from building 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 structural or ceiling suspension system. 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 the location of hangers required to support standard suspension system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
  - 3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  - 4. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices and fasteners that are secure and appropriate for structure as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
  - 5. Do not support ceilings directly from permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
  - 6. Do not attach hangers to steel deck tabs.
  - 7. Do not attach hangers to steel roof deck. Attach hangers to structural members.
  - 8. Do not connect or suspend steel framing from ducts, pipes or conduit.
- B. Sway-brace suspended steel framing with hangers used for support.
- C. For exterior soffits, install cross-bracing and framing to resist wind uplift.
- D. Install suspended steel framing components in sizes and at spacings indicated but not less than that required by the referenced steel framing installation standard.
  - 1. Wire Hangers: 0.1620-inch (8-gage) diameter, 4 feet o.c.

2. Carrying Channels (Main Runners): 1-1/2 inch, 4 feet o.c.
  3. Rigid Furring Channels (Furring Members): 16 inches o.c. or 24 inches o.c. as indicated.
- E. Installation Tolerances: Install steel framing components for suspended ceilings so that cross-furring members or grid suspension members are level to within 1/8 inch in 12 feet as measured both lengthwise on each member and transversely between parallel members.
- F. Wire-tie or clip furring members to main runners and to other structural supports as indicated.
- G. Grid Suspension System: Attach perimeter wall track or angle where grid suspension system meets vertical surfaces. Mechanically join main beam and cross-furring members to each other and butt-cut to fit into wall track.

### 3.5 INSTALLING STEEL FRAMING FOR WALLS AND PARTITIONS

- A. Install runners (tracks) at floors, ceilings, and structural walls and columns where gypsum board stud assemblies abut other construction.
1. Where studs are installed directly against exterior walls, install asphalt felt strips between studs and wall.
- B. Installation Tolerances: Install each steel framing and furring member so that fastening surfaces do not vary more than 1/8 inch from the plane formed by the faces of adjacent framing.
- C. Extend partition framing full height to structural supports or substrates above suspended ceilings. Cut studs 1/2 inch short of full height. Continue framing over frames for doors and openings and frame around ducts penetrating partitions above ceiling to provide support for gypsum board.
1. For smoke- and fire-resistive-rated partitions requiring partitions to extend to the underside of floor/roof slabs and decks or other continuous solid structural surfaces to obtain ratings, install framing around structural and other members extending below floor/roof slabs and decks, as needed, to support gypsum board closures needed to make partitions continuous from floor to underside of solid structure.
- D. Install steel studs and furring in sizes and at spacings indicated but not less than that required by the referenced steel framing installation standard to comply with maximum deflection and minimum loading requirements specified:
1. Single-Layer and Double Layer Construction: Space studs at 24 inches o.c. maximum unless noted otherwise.
- E. Install steel studs so that flanges point in the same direction and so that leading edges or ends of each gypsum board can be attached to open (unsupported) edges of stud flanges first.
- F. Frame door openings to comply with details indicated, with GA-600, and with applicable published recommendations of gypsum board manufacturer. Attach vertical studs at jambs with screws either directly to frames or to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
1. Extend vertical jamb studs through suspended ceilings and attach to underside of floor or roof structure above.

- G. Frame openings other than door openings to comply with details indicated or, if none indicated, in same manner as required for door openings. Install framing below sills of openings to match framing required above door heads.

### 3.6 JOIST INSTALLATION

- A. Install perimeter joist track sized to match joists. Align and securely anchor or fasten track to supporting structure at corners, ends, and spacings indicated on Shop Drawings.
- B. Space joists not more than 2 inches from abutting walls, and as indicated in article 2.4 for span.
- C. Frame openings with built-up joist headers consisting of joist and joist track, or another combination of connected joists if indicated.
- D. Install bridging as required. Fasten bridging at each joist intersection as follows:
  - 1. Bridging: Full depth blocking matching depth and thickness of joist. Secure blocking to joist webs.
- E. Secure joists to interior walls to prevent lateral movement of bottom flange.
- F. Install miscellaneous joist framing and connections, including web stiffeners, closure pieces, clip angles, continuous angles, hold-down angles, anchors, and fasteners, to provide a complete and stable joist-framing assembly.

### 3.7 APPLYING AND FINISHING GYPSUM BOARD, GENERAL

- A. Gypsum Board Application and Finishing Standards: Install and finish gypsum panels to comply with ASTM C 840 and GA-216.
- B. Install sound attenuation blankets where indicated prior to installing gypsum panels unless blankets are readily installed after panels have been installed on one side.
- C. Install ceiling board panels across framing to minimize the number of abutting end joints and avoid abutting end joints in the central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.
- D. Install wall / partition board panels to minimize the number of abutting end joints or avoid them entirely. Stagger abutting end joints not less than one framing member in alternate courses of board. At high walls, install panels horizontally with end abutting joints over studs and staggered.
- E. Install gypsum panels with face side out. Do not install imperfect, damaged, or damp panels. Butt panels together for a light contact at edges and ends with not more than 1/16 inch of open space between panels. Do not force into place.

- F. Locate both edge or end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Position adjoining panels so that tapered edges abut tapered edges, and field-cut edges abut field-cut edges and ends. Do not place tapered edges against cut edges or ends. Stagger vertical joints over different studs on opposite sides of partitions. Avoid joints at corners of framed openings where possible.
- G. Attach gypsum panels to steel studs so that the leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.
- H. Attach gypsum panels to framing provided at openings and cutouts.
- I. Spot grout hollow metal door frames for solid core wood doors, hollow metal doors, and doors over 32 inches wide. Apply spot grout at each jamb anchor clip and immediately insert gypsum panels into frames.
- J. Form control joints and expansion joints, with space between edges of adjoining gypsum panels, as well as supporting framing behind gypsum panels at locations indicated in Drawings or, if not indicated, as follows:
  - 1. Partitions, Walls, or Ceilings: Where element crosses a construction joint (expansion or control) in the base building structure.
  - 2. Partitions or Walls: Uninterrupted run in a straight plane shall not exceed 30 lineal feet.
  - 3. Ceilings (with perimeter relief): Linear direction shall not exceed 50 feet and total area between control joints shall not exceed 2,500 square feet.
  - 4. Ceilings (without perimeter relief): Linear direction shall not exceed 30 feet and total area between control joints shall not exceed 900 square feet.
  - 5. Ceilings, where framing members change direction.
- K. Cover both faces of steel stud partition framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chase walls that are braced internally.
  - 1. Except where concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than 8 sq. ft. in area.
  - 2. Fit gypsum panels around ducts, pipes, and conduits.
  - 3. Where partitions intersect open concrete coffer, concrete joists, and other structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by coffer, joists, and other structural members; allow 1/4-inch-to-1/2-inch-wide joints to install sealant.
- L. Isolate perimeter of non-load-bearing gypsum board partitions at structural abutments, except floors, as detailed. Provide 1/4-inch-to-1/2-inch-wide spaces at these locations and trim edges with U-bead edge trim where edges of gypsum panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
- M. Space fasteners in gypsum panels according to referenced gypsum board application and finishing standard and manufacturer's recommendations.
- N. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C 919 and with

manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

### 3.8 GYPSUM BOARD APPLICATION METHODS

- A. Single-Layer Application: Install gypsum wallboard panels as follows:
1. On ceilings, apply gypsum panels prior to wall/partition board application to the greatest extent possible and at right angles to framing, unless otherwise indicated.
  2. On partitions/walls, apply gypsum panels vertically (parallel to framing), unless otherwise indicated, and provide panel lengths that will minimize end joints.
  3. On partitions/walls, apply gypsum panels horizontally (perpendicular to framing), unless parallel application is required for fire-resistive-rated assemblies. Use maximum-length panels to minimize end joints.
  4. On Z-furring members, apply gypsum panels vertically (parallel to framing) with no end joints. Locate edge joints over furring members.
- B. Single-Layer Fastening Methods: Apply gypsum panels to supports as follows:
1. Fasten with screws.
- C. Multilayer Application:
1. On ceilings, apply gypsum board indicated for base layers before applying base layers on walls/partitions; apply face layers in same sequence. Apply base layers at right angles to framing members and offset face-layer joints one framing member, 16 inches minimum, from parallel base-layer joints, unless otherwise indicated or required by fire-resistance-rated assembly.
  2. On partitions/walls, apply gypsum board indicated for base layers and face layers vertically (parallel to framing) with joints of base layers located over stud or furring member and face-layer joints offset at least one stud or furring member with base-layer joints unless otherwise indicated or required by fire-resistance-rated assembly. Stagger joints on opposite sides of partitions.
  3. On Z-shaped furring members, apply base layer vertically (parallel to framing) and face layer either vertically (parallel to framing) or horizontally (perpendicular to framing) with vertical joints offset at least one furring member. Locate edge joints of base layer over furring members.
  4. Fastening Methods: Fasten base layers and face layers separately to supports with screws.

### 3.9 SHEATHING APPLICATION METHODS

- A. Cut boards at penetrations, edges, and other obstructions of the work; fit tightly against abutting construction, except provide a 3/8-inch setback where non-load-bearing construction abuts structural elements.
- B. Apply fasteners so that screw heads bear tightly against face of gypsum sheathing boards but do not cut into face paper.
- C. Do not bridge building expansion joints with gypsum sheathing; cut and space edges to match spacing of structural support elements.

- D. Installation: Install gypsum sheathing boards horizontally or vertically with face side out. Abut ends of boards over centers of stud flanges and stagger end joints of adjacent boards not less than one stud spacing, two where possible. Screw-attach boards at perimeter and within field of board to each steel stud with fasteners spaced approximately 8 inches o.c. and set back 3/8-inch minimum from edges and ends of boards.

### 3.10 INSTALLING TRIM ACCESSORIES

- A. General: For trim accessories with back flanges, fasten to framing with the same fasteners used to fasten gypsum board. Otherwise, fasten trim accessories according to accessory manufacturer's directions for type, length, and spacing of fasteners.
- B. Install corner beads at external corners.
- C. Install edge trim where edge of gypsum panels would otherwise be exposed or semiexposed. Provide edge trim type with face flange formed to receive joint compound except where other types are indicated.
  - 1. Install LC-bead where gypsum panels are tightly abutted to other construction and back flange can be attached to framing or supporting substrate.
  - 2. Install L-bead where edge trims can only be installed after gypsum panels are installed.
  - 3. Install U-bead at other locations where panel edges are exposed.
  - 4. Install aluminum edge trim and other accessories where indicated.
- D. Install control joints at locations indicated, and where not indicated according to ASTM C 840, and in locations approved by Architect for visual effect.
- E. Install H-molding in exterior gypsum board assemblies where control joints are indicated. Install on cut or ends of gypsum panels, not on tapered edges.

### 3.11 FINISHING GYPSUM BOARD ASSEMBLIES

- A. General: Apply joint treatment at gypsum board joints (both directions); flanges of corner bead, edge trim, and control joints; penetrations; fastener heads, surface defects, and elsewhere as required to prepare gypsum board surfaces for decoration and levels of gypsum board finish indicated.
- B. Prefill open joints, rounded or beveled edges, and damaged areas using setting-type joint compound.
- C. Apply joint tape over gypsum board joints except those with trim accessories having concealed face flanges not requiring taping to prevent cracks from developing in joint treatment at flange edges.
- D. Levels of Gypsum Board Finish: Provide the following levels of gypsum board finish in accordance with GA-214 and ASTM C 840.
  - 1. Level 1 for ceiling plenum areas, concealed areas, and where indicated, unless a higher level of finish is required for fire-resistive-rated assemblies and sound-rated assemblies.

2. Level 2 where water-resistant gypsum backing board panels form substrates for tile, and where indicated.
  3. Level 4 for gypsum board surfaces unless otherwise indicated.
  4. Level 5 for gypsum board surfaces indicated to receive markerwall (MW).
- E. For Level 4 gypsum board finish, embed tape in joint compound and apply three separate coats of joint compound over joints, angles, fastener heads, and accessories. Touch up and sand between coats and after last coat as needed to produce a surface free of visual defects and ready for decoration. Use the following joint compound combination:
1. Embedding and First Coat: Ready-mixed, drying-type, all-purpose or taping compound.
  2. Fill (Second) Coat: Ready-mixed, drying-type, all-purpose or topping compound.
  3. Finish (Third) Coat: Ready-mixed, drying-type, all-purpose or topping compound.
- F. Where Level 2 gypsum board finish is indicated, apply joint compound specified for first coat in addition to embedding coat.
- G. Where Level 1 gypsum board finish is indicated, apply joint compound specified for embedding coat.

### 3.12 APPLYING TEXTURE FINISHES

- A. Surface Preparation and Primer: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes according to texture finish manufacturer's instructions. Apply primer only to surfaces that are clean, dry, and smooth.
- B. Texture Finish Application: Mix and apply finish to gypsum panels and other surfaces indicated to receive texture finish according to texture finish manufacturer's directions. Using powered spray equipment acceptable to texture finish manufacturer, produce a uniform texture matching approved field samples and free of starved spots or other evidence of thin application or of application patterns.
- C. Prevent texture finishes from coming into contact with surfaces not indicated to receive texture finish by covering them with masking agents, polyethylene film, or other means. If despite these precautions, texture finishes contact these surfaces, immediately remove droppings and overspray as recommended by texture finish manufacturer to prevent damage.

### 3.13 CLEANING AND PROTECTION

- A. Promptly remove any residual joint compound from adjacent surfaces.
- B. Provide final protection and maintain conditions, in a manner suitable to Installer, that ensures gypsum board assemblies remain without damage or deterioration at time of Substantial Completion.

END OF SECTION

## SECTION 092117 - GYPSUM BOARD SHAFT-WALL ASSEMBLIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Shaft enclosures.
  - 2. Horizontal enclosures.
- B. Related Sections:
  - 1. Section 09 8100 "Acoustic Insulation" for sound attenuating blankets and additional requirements.

#### 1.3 DEFINITIONS

- A. Gypsum Board Construction Terminology: Refer to ASTM C 11 and GA 505 for definitions of terms for gypsum board construction not otherwise defined in this Section or other referenced standards.

#### 1.4 ASSEMBLY PERFORMANCE REQUIREMENTS

- A. Performance Requirements, General: Provide gypsum board shaft-wall assemblies that comply with the following requirements:
  - 1. They are composed of proprietary gypsum board panels and metal components designed for erection from outside the shafts.
  - 2. They comply with performance requirements specified as determined from testing manufacturers' standard assemblies representing those indicated for this Project.
- B. Fire Resistivity: Fabricate and install gypsum board shaft-wall assemblies to have fire-resistance ratings of one hour.

#### 1.5 ACTION SUBMITTALS

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

## 1.6 INFORMATIONAL SUBMITTALS

- A. Assembly Test Reports: From a qualified independent testing agency certifying and substantiating compliance of gypsum board shaft-wall assemblies with structural and sound-attenuation performance requirements based on tests performed on manufacturers' standard assemblies representing those indicated.

## 1.7 QUALITY ASSURANCE

- A. Fire-Test-Response Characteristics: Provide gypsum board shaft-wall assemblies that comply with the following requirements:
  - 1. Fire-resistivity tests are performed by a qualified testing and inspecting agency. A qualified testing and inspecting agency includes UL, Warnock Hersey, or another agency performing testing and follow-up services that is acceptable to authorities having jurisdiction.
  - 2. Gypsum board wall assemblies indicated are identical in materials and construction to those tested for fire resistivity per ASTM E 119.
  - 3. Fire-resistance-rated assemblies are indicated by GA File Numbers in GA-600 "Fire Resistance Design Manual," design designations listed in the UL "Fire Resistance Directory," or by Warnock Hersey or another qualified testing and inspecting agency.
- B. Single-Source Responsibility: Obtain components for gypsum board shaft-wall assemblies from a single manufacturer for each type of assembly indicated **or** system with all components as submitted shall have independent third party testing of complete system as indicated in paragraphs 1.5.A and 1.6.A above.

## 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in original packages, containers, and bundles bearing brand name and identification of manufacturer or supplier.
- B. Store materials inside under cover and keep them dry and protected against damage from weather, direct sunlight, surface contamination, corrosion, construction traffic, and other causes. Neatly stack gypsum boards flat to prevent sagging.
- C. Handle gypsum boards to prevent damage to edges, ends, and surfaces. Do not bend or otherwise damage metal trim and framing components.

## 1.9 PROJECT CONDITIONS

- A. Comply with requirements for environmental conditions, room temperatures, and ventilation specified in Division 09 Section "Gypsum Board Assemblies."

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

1. BPB America, Inc.
2. G-P Gypsum.
3. National Gypsum Co.
4. PABCO Gypsum.
5. USG Corporation.

## 2.2 BASIC ASSEMBLY MATERIALS

- A. General: Provide standard materials and components listed in manufacturer's published product literature for gypsum board shaft-wall assemblies of type and application indicated. Provide gypsum and other panels in maximum lengths available to eliminate or minimize end-to-end butt joints and in thicknesses required to produce assemblies complying with structural and other performance requirements.
- B. Steel Framing: ASTM C 645, of profile, size, and base metal thickness required to produce assemblies complying with Part 1 "Assembly Performance Requirements" Article; with sectional properties computed to conform with AISI "Specification for the Design of Cold-Formed Steel Structural Members"; and as follows:
  1. Protective Coating: Manufacturer's standard corrosion-resistant coating.
- C. 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.
- D. Gypsum Wallboard: ASTM C 36, type as required by fire-resistant assembly indicated, and as follows:
  1. Edges: Tapered and featured (rounded or beveled) for prefilling.
- E. Gypsum Backing Board for Multilayer Applications: ASTM C 442 or, where backing board is not available from manufacturer, gypsum wallboard, ASTM C 36, type as required by fire-resistant assembly indicated, edge configuration as standard with manufacturer.
- F. Accessories: Corner beads, edge trim, and control joints of material and shapes specified in the Division 09 Section referenced below that comply with gypsum board shaft-wall assembly manufacturer's recommendation for application indicated.
  1. "Gypsum Board Assemblies."
- G. Gypsum Wallboard Joint Treatment Materials: Provide materials complying with ASTM C 475 and recommendations of gypsum board shaft-wall assembly manufacturer for the applications indicated, and as specified in Division 09 Section "Gypsum Board Assemblies."

## 2.3 MISCELLANEOUS MATERIALS

- A. General: Provide auxiliary materials for gypsum board shaft-wall construction that comply with requirements indicated and recommendations of gypsum board shaft-wall assembly manufacturer.
- B. Laminating Adhesive: Special adhesive or joint compound recommended for laminating gypsum boards of type indicated.

- C. Steel drill screws complying with ASTM C 1002 for fastening gypsum board to steel members less than 0.03 inch thick.
- D. Runner Fasteners: Power-driven fasteners of type indicated below and of size and material required to withstand loading conditions imposed on shaft-wall assemblies without exceeding allowable design stress of runners, fasteners, or structural substrates where anchors are embedded.
  - 1. Powder-Actuated Fasteners: Provide powder-actuated fasteners with the capability to sustain, without failure, a load equal to 10 times that imposed by shaft-wall assemblies, as determined from testing per ASTM E 1190 by a qualified testing agency.

#### 2.4 BASIC ASSEMBLY DESCRIPTION

- A. General: Characteristics of selected components are described below for purposes of indicating proprietary gypsum board shaft-wall assemblies that are manufacturer's standard. Provide complete shaft-wall assemblies that comply with requirements indicated in this Article and Part 1 "Assembly Performance Requirements" Article.
- B. Cavity Shaft-Wall Assemblies: Provide assemblies constructed of proprietary gypsum liner panels inserted between steel tracks at each end of studs; with specially shaped steel studs engaged in tracks and fitted between gypsum liner panels; and with gypsum board on finished side or sides applied to studs in the number of layers, thicknesses and arrangement indicated.
  - 1. Gypsum Liner Panel Thickness: Not less than 1 inch.
  - 2. Stud Shape: C-H.
  - 3. Stud Thickness: 0.0199-inch minimum thickness of base metal.
  - 4. Stud Depth: 4 inches.
  - 5. Room-Side Finish: 5/8 inch thick gypsum board.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates to which gypsum board shaft-wall assemblies attach or abut with Installer present. Substrates include hollow metal frames, elevator hoistway door frames, cast-in anchors, and structural framing for compliance with requirements for installation tolerances and other conditions affecting performance of gypsum board shaft-wall assemblies. Do not proceed with installation until unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION OF GYPSUM BOARD SHAFT-WALL ASSEMBLIES

- A. General: Install gypsum board shaft-wall assemblies to comply with performance and other requirements indicated as well as with manufacturer's installation instructions and the following:
  - 1. ASTM C 754 for installing steel framing.
  - 2. Division 09 Section "Gypsum Board Assemblies" for applying and finishing gypsum wallboard.
- B. Do not bridge building expansion joints with shaft-wall assemblies; frame both sides of joints with furring and other support as indicated.

- C. Install supplementary framing in gypsum board shaft-wall assemblies around openings and as required for blocking, bracing, and support of gravity and pullout loads of fixtures, equipment, services, heavy trim, furnishings, and similar items that cannot be supported directly by shaft-wall assembly framing.
- D. At penetrations in shaft wall, maintain fire-resistance rating of entire shaft-wall assembly by installing supplementary steel framing around perimeter of penetration and fire protection behind boxes containing wiring devices, elevator call buttons, elevator floor indicators, and similar items.
- E. Isolate shaft-wall assemblies from building structure at locations indicated to prevent transfer of loading imposed by structural movement. Comply with details indicated on Drawings.
- F. Seal gypsum board shaft-walls at perimeter of each section that abuts other work and at joints and penetrations within each section. Install acoustical sealant to withstand dislocation by air pressure differential between shaft and external spaces; comply with manufacturer's instructions and ASTM C 919.

### 3.3 PROTECTION

- A. Provide final protection and maintain conditions in a manner acceptable to Installer that ensures gypsum board shaft-wall assemblies are without damage or deterioration at the time of Substantial Completion.

END OF SECTION



## SECTION 09 3000 - TILING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Glazed ceramic wall tile and coved base.
  - 2. Porcelain floor tile and coved base.

#### 1.3 ACTION SUBMITTALS

- A. Samples: For verification, of each item listed below, prepared on Samples of size and construction indicated, products involving color and texture variations, in sets showing full range of variations expected.
  - 1. Submit for Architect's verification one sample of each different color of porcelain tile base and grout specified herein.
- B. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.
- C. Product Data: For each type of tile, mortar, grout and other products specified.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations for Tile: Obtain tile from single source or producer.
  - 1. Obtain tile of each type and color or finish from same production run and of consistent quality in appearance and physical properties for each contiguous area.
- B. Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each mortar, adhesive, and grout component from single manufacturer and each aggregate from single source or producer.
  - 1. Obtain setting and grouting materials, except for unmodified Portland cement and aggregate, from single manufacturer.
  - 2. Obtain waterproof membrane, from manufacturer of setting and grouting materials.

#### 1.5 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 requirement of ANSI A137.1 for labeling sealed tile packages.

- B. Prevent damage or contamination to materials by water, freezing, foreign matter, and other causes.

#### 1.6 PROJECT CONDITIONS

- A. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacturer's printed recommendations.
- B. Vent temporary heaters to exterior to prevent damage to tile work from carbon dioxide buildup.
- C. Maintain temperatures at 50 deg F or more in tiled areas during installation and for 7 days after completion, unless higher temperatures are required by referenced installation standard or manufacturer's instructions.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Glazed Ceramic and Porcelain Tiles:
    - a. American Marazzi Tile, Inc.
    - b. American Olean; a division of Dal-Tile Corporation.
    - c. Crossville, Inc.
    - d. Daltile.
    - e. Interceramic.
  - 2. Mortars and Grouts:
    - a. Bostik, Inc.
    - b. C-Cure.
    - c. Custom Building Products.
    - d. Laticrete International, Inc.
    - e. MAPEI Corporation.
    - f. TEC; H.B. Fuller Construction Products Inc.

#### 2.2 PRODUCTS, GENERAL

- A. ANSI Standard for Ceramic Tile: Comply with ANSI A137.1 "American National Standard Specifications for Ceramic Tile" for types, compositions, and grades of tile indicated.
  - 1. Furnish tile complying with "Standard Grade" requirements unless otherwise indicated.
- B. ANSI Standard for Tile Installation Materials: Comply with ANSI standard referenced with products and materials indicated for setting and grouting.
- C. Factory Blending: For tile exhibiting color variations within the ranges selected during sample submittals, blend tile in factory and package accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples.

- D. Mounting: Where factory-mounted tile is required, provide back- or edge-mounted tile assemblies as standard with manufacturer unless another mounting method is indicated.

### 2.3 TILE PRODUCTS

- A. Glazed Ceramic Wall Tile (CT): Provide glazed ceramic tile complying with the following requirements:
1. Manufacturer / Pattern: As indicated on Drawings.
  2. Nominal Facial Dimensions: 4.25- by 4.25 inches.
  3. Nominal Thickness: 5/16 inch.
  4. Colors: As indicated on Drawings
- B. Trim Units: Provide trim units to match characteristics of adjoining flat tile and to comply with the following requirements:
1. Size: As indicated, coordinated with sizes and coursing of adjoining flat tile where applicable.
  2. Shapes: As follows, selected from manufacturer's standard shapes:
    - a. Base: Coved base at Toilet Rooms shall have 3/8-inch radius cove to comply with applicable Health Department codes.
    - b. Internal Corners: Field-buttet square corners.
    - c. Other trim as required to achieve patterns shown.
- C. Porcelain Floor Tile: Provide porcelain tile complying with the following requirements:
1. Nominal Facial Dimensions: 2- by 1 inches.
  2. Nominal Thickness: 1/4 inch.
  3. Manufacturer / Pattern: As indicated on Drawings.
    - a. Colors: As indicated on Drawings.

### 2.4 SETTING MATERIALS

- A. Portland Cement Mortar Installation Materials: Provide materials complying with ANSI A108.1 and as specified below.
1. Latex additive (water emulsion) described below, of type specifically recommended by latex additive manufacturer for use with job-mixed portland cement and aggregate mortar bed.
    - a. Latex Additive: Manufacturer's standard.
- B. Latex-Portland Cement Mortar: ANSI A118.4, composition as follows:
1. Latex additive (water emulsion) of type described below, combined at job site with prepackaged dry mortar mix supplied or specified by latex additive manufacturer.
    - a. Latex Type: Manufacturer's standard.
    - b. Latex-Portland Cement Mortar shall be quality similar to Custom Building Products Polyblend® with MoldGard® Technology.

### 2.5 GROUTING MATERIALS

- A. Single Component Grout: Single component grout shall meet or exceed the performance criteria of ANSI A118.7 and A118.3.
1. Color: As indicated on Drawings.

- B. Manufacturers: Refer to Paragraph 2.1.A.3 above. Quality of single component grout used on this Project shall be similar to Custom Building Products Fusion Pro®.
  - 1. Compressive Strength: >3,300 psi.
  - 2. Stain Resistance: 0.5-1 per CTIOA T-72 without use of grout sealer.

## 2.6 ELASTOMERIC SEALANTS

- A. General: Provide manufacturer's standard chemically curing, elastomeric sealants of base polymer indicated that comply with requirements of Division 07 Section "Joint Sealants," including ASTM C 920 as referenced by Type, Grade, Class, and Uses.
- B. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.

## 2.7 MISCELLANEOUS MATERIALS

- A. Metal Edge Strips: Zinc alloy or stainless steel terrazzo strips, 1/8-inch wide at top edge with integral provision for anchorage to mortar bed or substrate unless otherwise indicated.
  - 1. NOTE: Metal edge strip separates bottom row of wall tile from cove base of resinous flooring system.
- B. Protective Materials: Neutral cleaner such as Hillyard Super Shine All.

## 2.8 MIXING MORTARS AND GROUT

- A. Mix mortars and grouts to comply with requirements of referenced standards and manufacturers including those for accurate proportioning of materials, water, or additive content; type of mixing equipment, selection of mixer speeds, mixing containers, mixing time, and other procedures needed to produce mortars and grouts of uniform quality with optimum performance characteristics for application indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and areas 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, and free from oil or waxy films and curing compounds and are within flatness tolerances required by ANSI A108.
  - 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 before installing tile.
- B. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Blending: For tile exhibiting color variations within the ranges selected during sample submittals, verify that tile has been blended in factory and packaged accordingly so that tile units taken from one package show the same range in colors as those taken from other packages and match approved samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

### 3.3 INSTALLATION, GENERAL

- A. ANSI Tile Installation Standard: Comply with parts of ANSI 108 series of tile installation standards included under "American National Standard Specifications for the Installation of Ceramic Tile" that apply to type of setting and grouting materials and methods indicated.
  - 1. Tolerances: Install cementitious backer units with surface plane to within 1/8 inch in 8 feet. Glue unit to metal framing prior to screwing. Tape joints.
- B. Tile Council of North America, Inc. (TCNA) Installation Guidelines: TCNA "Handbook for Ceramic Tile Installation"; comply with TCNA installation methods indicated.
- C. Extend tile work into recesses and under or behind equipment and fixtures to form a complete covering without interruptions except as otherwise shown. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
- D. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so that plates, collars, or covers overlap tile.
- E. Jointing Pattern: Unless otherwise shown, lay tile in grid pattern. Lay out tile work and center tile fields in both directions in each space or on each wall area. Adjust to minimize tile cutting. Provide uniform joint widths unless otherwise shown.
- F. Expansion Joints: Locate expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated during installation of setting materials, mortar beds, and tile. Do not saw cut joints after installation of tiles.
  - 1. Locate joints in tile surfaces directly above joints in concrete substrates.
  - 2. Install expansion joints in accordance with TCNA EJ171.
  - 3. Prepare joints and apply sealants to comply with requirements of Division 07 Section "Joint Sealants."
- G. Grout tile to comply with the requirements of the following installation standards:
  - 1. For chemical-resistant epoxy grouts, comply with ANSI A108.6.
- H. Install mildew-resistant silicone sealant at inside corners of wall tile. Sealant color shall match color of grout.

### 3.4 FLOOR INSTALLATION METHODS

- A. Floor Tile, Typical: Install tile to comply with requirements indicated below for setting bed methods, TCNA installation methods related to types of subfloor construction, and grout types:
  - 1. Crack Isolation Mat: TCNA F125-Partial Coverage.
  - 2. Latex Modified Portland Cement Mortar: ANSI A108.4
    - a. Bond Coat: Latex-portland cement mortar, ANSI A108.4 or ANSI A108.5.
    - b. Concrete Subfloors, Typical: TCNA F115-13.
    - c. Concrete Subfloors at Elevated Slabs, Typical: TCNA F115A-13, with crack isolation membrane.
    - d. Concrete Subfloors at Elevated Slabs with Restrooms: TCNA F122A-13.
    - e. Grout: Single component.

### 3.5 WALL TILE INSTALLATION METHODS

- A. Install types of tile designated for wall application to comply with requirements indicated below for setting-bed methods, TCNA installation methods related to subsurface wall conditions, and grout types:
  - 1. Latex-Portland Cement Mortar: ANSI A108.5.
    - a. Metal Studs, Interior: TCNA W243-14.
    - b. Grout: Single component.
- B. Refer to Drawings for ceramic tile patterns at walls.

### 3.6 CLEANING AND PROTECTION

- A. Cleaning: Upon completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.
- B. Finished Tile Work: Leave finished installation clean and free of cracked, chipped, broken, unbonded, and otherwise defective tile work.
- C. Provide final protection and maintain conditions in a manner acceptable to manufacturer and installer that ensures that tile is without damage or deterioration at time of Substantial Completion.
- D. When recommended by tile manufacturer, apply a protective coat of neutral protective cleaner to completed tile walls.
- E. Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

### 3.7 EXTRA MATERIALS

- A. Supply extra 2 percent of each tile used in clean, marked carton for Owner's use.

END OF SECTION

## SECTION 09 5113 - ACOUSTICAL PANEL CEILINGS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes ceilings consisting of the following:
  - 1. Acoustical panels.
  - 2. Suspension systems.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Samples: For verification purposes of each type of exposed finish required, prepared on samples of size indicated below and of same thickness and material indicated for final unit of Work. Where finishes involve normal color and texture variations, include sample sets showing full range of variations expected.
  - 1. 6-inch-square samples of each acoustical panel type, pattern, and color.
  - 2. Set of 12-inch-long samples of exposed suspension system members, including edge moldings, for each color and system type required.

#### 1.4 QUALITY ASSURANCE

- A. Fire-Performance Characteristics: Provide acoustical ceilings that are identical to those tested for the following fire-performance characteristics, per ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify acoustical ceiling components with appropriate markings of applicable testing and inspecting organization.
  - 1. Surface Burning Characteristics: As follows, tested per ASTM E 84 and complying with ASTM E 1264 for Class A products.
    - a. Flame Spread: 25 or less.
    - b. Smoke Developed: 50 or less.
- B. Single-Source Responsibility for Suspended Acoustical Ceiling System: Obtain each type of acoustical ceiling unit including suspension system from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver acoustical ceiling units to project site in original, unopened packages and store them in a fully enclosed space where they will be protected against damage from moisture, direct sunlight, surface contamination, and other causes.
- B. Before installing acoustical ceiling units, permit them to reach room temperature and a stabilized moisture content.
- C. Handle acoustical ceiling units carefully to avoid chipping edges or damaging units in any way.

1.6 PROJECT CONDITIONS

- A. Space Enclosure: Do not install interior acoustical ceilings until space is enclosed and weatherproof, wet-work in space is completed and nominally dry, work above ceilings is complete, and ambient conditions of temperature and humidity will be continuously maintained at values near those indicated for final occupancy.

1.7 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials described below that match products installed, are packaged with protective covering for storage, and are identified with appropriate labels.
  - 1. Acoustical Ceiling Units: Furnish quantity of full-size units equal to 2 percent of amount installed.
  - 2. Exposed Suspension System Components: Furnish quantity of each exposed component equal to 2 percent of amount installed.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the following:
  - 1. Mineral Base Panels - Typical unless noted otherwise on Reflected Ceiling Plans. Water felted, with painted finish and perforated and fissured pattern, non-fire-resistance rated. Color: White.  
**APC-1:**
    - a. "Fine Fissured, High NRC," Armstrong World Industries, Inc. (#1810)
    - b. "Radar High-NRC Panels," USG Corporation (#22111)
  - 2. Glass-Fiber Based: Glass-fiber based panels with painted membrane overlay finish and perforated pattern, non-fire-resistance rated. Color: White.  
**APC-2:**
    - a. "Optima," Armstrong World Industries, Inc. (#3160)
    - b. "Halcyon Large Sizes," USG Corporation (#98441)
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Acoustical Ceiling Panels:
    - a. Armstrong World Industries, Inc.

- b. USG Interiors, Inc.
2. Non-Fire-Resistance-Rated Double-Web Steel Suspension Systems:
  - a. Armstrong World Industries, Inc.
  - b. USG Interiors, Inc.
3. Edge Moldings:
  - a. Armstrong World Industries, Inc.
  - b. Fry Reglet Corp.
  - c. USG Interiors, Inc.

## 2.2 ACOUSTICAL CEILING UNITS, GENERAL

- A. Standard for Acoustical Ceiling Units: Provide manufacturers' standard units of configuration indicated that comply with ASTM E 1264 classifications as designated by reference to 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 away from the test surface) per ASTM E 795.
- B. Colors and Patterns: Provide products to match appearance characteristics indicated under each product type.

## 2.3 MINERAL-BASE PANELS - WATER FELTED (**APC-1**)

- A. **APC-1** Panel Characteristics: Type III, Form 2 units per ASTM E 1264, with pattern designations C and E, with other panel characteristics as follows:
  1. Item Number: Armstrong #1810.
  2. Color/Light Reflectance Coefficient: White/LR 0.85.
  3. Noise Reduction Coefficient: NRC 0.70.
  4. Edge Detail: Square.
  5. Size: 24 inches by 24 inches by 3/4 inch.
  6. Manufacturer's "No Sag" warranty
  7. Humidity-Resistant HumiGuard Plus performance

## 2.4 GLASS-FIBER-BASED PANELS (**APC-2**)

- A. **APC-2** Panel Characteristics: Type XII, Form 2 units per ASTM E 1264, with pattern designations E, with other panel characteristics as follows:
  1. Item Number: Armstrong #3160.
  2. Color/Light Reflectance Coefficient: White/LR 0.90.
  3. Noise Reduction Coefficient: NRC 0.95.
  4. Edge Detail: Square.
  5. Size: 48 inches by 48 inches by 1 inch.
  6. Manufacturer's "No Sag" warranty
  7. Humidity-Resistant HumiGuard Plus performance

## 2.5 METAL SUSPENSION SYSTEMS, GENERAL

- A. Standard for Metal Suspension Systems: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable ASTM C 635 requirements.
- B. Finishes and Colors: Provide manufacturer's standard factory-applied finish for type of system indicated.

- C. Attachment Devices: Size for 5 times design load indicated in ASTM C 635, Table 1, Direct Hung unless otherwise indicated.
- D. Wire for Hangers and Ties: ASTM A 641, Class 1 zinc coating, soft temper.
  - 1. Gage: Provide wire sized so that stress at 3 times hanger design load (ASTM C 635, Table 1, Direct-Hung), will be less than yield stress of wire, but provide not less than 0.106-inch diameter (12 gage).
- E. Edge Moldings and Trim: Metal or extruded aluminum of types and profiles indicated or, if not indicated, manufacturer's standard moldings for edges and penetrations that fit type of edge detail and suspension system indicated. Provide column surround trim at round columns.

## 2.6 NON-FIRE-RESISTANCE-RATED DIRECT-HUNG SUSPENSION SYSTEMS

- A. Wide-Face Capped Double-Web Steel Suspension System: Main and cross-runners roll-formed from prepainted or electrolytic zinc-coated cold-rolled steel sheet, with prefinished 15/16-inch-wide metal caps on flanges; other characteristics as follows:
  - 1. Structural Classification: Intermediate-Duty System.
  - 2. End Condition of Cross-Runners: Override (stepped) or butt-edge type, as standard with manufacturer.
  - 3. Cap Material and Finish: Steel sheet painted white.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and structural framing to which ceiling system attaches or abuts, with Installer present, for compliance with requirements specified in this and other Sections that affect installation and anchorage of ceiling system. Do not proceed with installation until unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Coordination: Furnish layouts for preset inserts, clips, and other ceiling anchors whose installation is specified in other Sections.
  - 1. Furnish concrete inserts and similar devices to other trades for installation well in advance of time needed for coordination of other work.
- B. Measure each ceiling area and establish layout of acoustical units to balance border widths at opposite edges of each ceiling. Avoid use of less-than-half-width units at borders, and comply with reflected ceiling plans.

### 3.3 INSTALLATION

- A. General: Install acoustical ceiling systems to comply with installation standard referenced below, per manufacturer's instructions and CISCA "Ceiling Systems Handbook."
  - 1. Standard for Installation of Ceiling Suspension Systems: Comply with ASTM C 636.
- B. Arrange acoustical units in a manner shown by reflected ceiling plans.

- C. Suspend ceiling hangers from building 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 structural or ceiling suspension system. 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 the 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. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards.
  3. Secure wire hangers by looping and wire-tying, either directly to structures or to inserts, eyescrews, or other devices that are secure and appropriate for substrate, and in a manner that will not cause them to deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
  4. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eyescrews, or other devices that are secure and appropriate for structure to which hangers are attached as well as for type of hanger involved, and in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
  5. Space hangers not more than 4'-0" o.c. along each member supported directly from hangers, unless otherwise shown, and provide hangers not more than 8 inches from ends of each member.
- D. Install edge moldings of type indicated at perimeter of acoustical ceiling area and where necessary to conceal edges of acoustical units.
1. Install straight perimeter trim at clouds in locations shown.
- E. Install acoustical panels in coordination with suspension system, with edges concealed by support of suspension members. Scribe and cut panels to fit accurately at borders and at penetrations.

### 3.4 CLEANING

- A. Clean exposed surfaces of acoustical ceilings, including trim, edge moldings, and suspension members. Comply with manufacturer's instructions for cleaning and touch-up of minor finish damage. Remove and replace work that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION



## SECTION 09 6513 - RESILIENT BASE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section contains Specifications for the following:
  - 1. Rubber wall base (Type TS - Rubber, Vulcanized Thermoset). **(RB)**

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product specified.
- B. Samples for verification purposes in manufacturer's standard sample sets, but not less than 12 inches long, of each different color and pattern of product specified.

#### 1.4 QUALITY ASSURANCE

- A. Single-Source Responsibility for Products: Obtain each type and color of product specified from a single source with resources to provide products of consistent quality in appearance and physical properties without delaying progress of the Work.
- B. Fire Performance Characteristics: Provide products with the following fire performance characteristics as determined by testing products per ASTM test method indicated below by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
  - 1. Critical Radiant Flux: 0.45 watts per sq. cm or more per ASTM E 648.
  - 2. Smoke Density: Less than 450 per ASTM E 662.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to Project site in original manufacturer's unopened cartons and containers, each bearing names of product and manufacturer, Project identification, and shipping and handling instructions.
- B. Store products in dry spaces protected from the weather with ambient temperatures maintained between 50 deg F and 90 deg F.
- C. Move products into spaces where they will be installed at least 48 hours in advance of installation.

## 1.6 PROJECT CONDITIONS

- A. Maintain a minimum temperature of 70 deg F in spaces to receive products specified in this Section for at least 48 hours prior to installation, during installation, and for not less than 48 hours after installation. After this period, maintain a temperature of not less than 55 deg F.
- B. Do not install products until they are at the same temperature as that of the space where they are to be installed.
- C. Close spaces to traffic during installation of products specified in this Section.

## 1.7 SEQUENCING AND SCHEDULING

- A. Sequence installing products specified in this Section with other construction to minimize possibility of damage and soiling during remainder of construction period.

## 1.8 EXTRA MATERIALS

- A. Deliver extra materials to Owner. Furnish extra materials matching products installed as described below, packaged with protective covering for storage, and identified with labels clearly describing contents.
  - 1. Furnish not less than 10 linear feet for each 500 linear feet or fraction thereof of each different type and color of resilient wall base installed.
  - 2. Deliver extra materials to Owner.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide one of the products specified in each Product Data Sheet at end of this Section.

### 2.2 RESILIENT WALL BASE

- A. Rubber Wall Base: Products complying with ASTM F 1861, Type TS, Group I, and requirements specified in the Rubber Wall Base Product Data Sheet at end of this Section.

### 2.3 INSTALLATION ACCESSORIES

- A. Adhesives: Water-resistant type recommended by manufacturer to suit resilient product and substrate conditions indicated.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine areas where installation of products specified in this Section will occur, with Installer present, to verify that substrates and conditions are satisfactory for installation and comply with manufacturer's requirements and those specified in this Section.

### 3.2 PREPARATION

- A. General: Comply with manufacturer's installation specifications for preparing substrates indicated to receive products indicated.
- B. Clean substrates to be covered immediately before installing products specified in this Section.

### 3.3 INSTALLATION

- A. General: Install products specified in this Section using methods indicated according to manufacturer's installation directions.
- B. Apply resilient wall base to walls, columns, pilasters, casework, and other permanent fixtures in rooms and areas where base is required. Install wall base in lengths as long as practicable. Tightly adhere wall base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.
  - 1. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient wall base with manufacturer's recommended adhesive filler material.
  - 2. Install exterior corners before installing straight pieces.

### 3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after completing installation:
  - 1. Remove visible adhesive and other surface blemishes using cleaner recommended by manufacturers of resilient product involved.
- B. Clean products specified in this Section not more than 4 days prior to dates scheduled for inspections intended to establish date of Substantial Completion in each area of Project. Clean products using method recommended by manufacturer.

RUBBER WALL BASE PRODUCT DATA SHEET

Rubber Wall Base Designation: **RB**

Style: Cove with top-set toe (ASTM F 1861, Style B)

Minimum Nominal Thickness: 1/8 inch

Height: 4 inches

Lengths: Coils in lengths standard with manufacturer but not less than 100 feet

Exterior Corners: Premolded

Interior Corners: Premolded

Acceptable Manufacturers: Roppe  
Burke Mercer  
Johnsonite

Colors: **As indicated on Drawings**

END OF SECTION

## SECTION 096519 - RESILIENT TILE 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. Vinyl composite floor tile.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. 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.
- C. Samples for Verification: Full-size units of each color and pattern of floor tile required.

#### 1.4 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of floor tile 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. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

#### 1.6 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for floor tile installation and seaming method indicated.
  - 1. Engage an installer who employs workers for this Project who are trained or certified by floor tile manufacturer for installation techniques required.

1.7 DELIVERY, STORAGE, AND HANDLING

- A. Store floor tile 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. Store floor tiles on flat surfaces.

1.8 FIELD 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 floor tile during the following time periods:
  - 1. 48 hours before installation.
  - 2. During installation.
  - 3. 48 hours after installation.
- B. After installation and until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F.
- C. Close spaces to traffic during floor tile installation.
- D. Close spaces to traffic for 48 hours after floor tile installation.
- E. Install floor tile after other finishing operations, including painting, have been completed.

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 (VCT)

- A. Manufacturers Subject to compliance with requirements, provide products by one of the following:
  - 1. Armstrong World Industries, Inc.
  - 2. Mannington Mills, Inc.
  - 3. Johnsonite, a Tarkett Company.
- B. Tile Standard: ASTM F 1066, Class 2, through-pattern tile.
- C. Wearing Surface: Smooth.
- D. Thickness: 0.125 inch.

- E. Size: 12 by 12 inches.
- F. Colors and Patterns: As indicated on Drawings.

### 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.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
  - 1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of floor tile.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.
- B. Concrete Substrates: Prepare according to ASTM 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.
  - 3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 10 pH.
  - 4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:
    - a. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level or as required by resilient flooring manufacturer.

- C. At concrete slab-on-grade conditions, apply moisture remediation product to existing slab per manufacturer's written instructions.
- 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.
  - 1. At least 48 hours in advance of installation, move resilient floor tile and installation materials into spaces where they will be installed.
- F. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

### 3.3 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 as indicated on Drawings.
- 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.
- 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. 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.

### 3.4 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protecting floor tile.
- B. Perform the following operations immediately after completing floor tile 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 floor tile from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
  - D. Cover floor tile until Substantial Completion.

END OF SECTION



## SECTION 09 6536 - STATIC-CONTROL RESILIENT 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. Static-dissipative, vinyl composition floor tile.
- B. Related Requirements:
  - 1. Section 09 6513 "Resilient Base and Accessories" for resilient base, reducer strips, and other accessories installed with static-control resilient flooring.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to static-control resilient flooring including, but not limited to, the following:
    - a. Examination and preparation of substrates to receive static-control resilient flooring.
    - b. Installation.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For each type of static-control resilient flooring. Include floor-covering layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
  - 1. Show details of special patterns.
  - 2. Show locations of inscribed maintenance tiles.
  - 3. Submit grounding diagram showing location of grounding strips and connections.
- C. Samples for Verification: For each type of static-control resilient flooring, of size indicated below:
  - 1. Floor Tile: 6-by-9-inch units.
- D. Product Schedule: For static-control resilient flooring. Use same designations indicated on Drawings.

1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for static-control resilient flooring.
- C. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of static-control resilient flooring to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Floor Tile: Furnish one box for every 50 boxes or fraction thereof, of each type, color, and pattern of floor tile installed.

1.8 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs workers for this Project who are competent in techniques required by manufacturer for static-control resilient flooring.
  - 1. Engage an installer who employs workers for this Project who are trained or certified by manufacturer for installation techniques required.

1.9 DELIVERY, STORAGE, AND HANDLING

- A. Store static-control resilient flooring 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. Floor Tile: Store on flat surfaces.

1.10 PROJECT CONDITIONS

- A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 85 deg F, in spaces to receive static-control resilient flooring 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. Close spaces to traffic during static-control resilient flooring installation.
- D. Close spaces to traffic for 48 hours after static-control resilient flooring installation.
- E. Install static-control resilient flooring after other finishing operations, including painting, have been completed.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Static-Dissipative Properties: Provide static-control resilient flooring with static-control properties indicated as determined by testing identical products per test method indicated by an independent testing and inspecting agency.
  - 1. Electrical Resistance: Test per ASTM F 150 with 100-V applied voltage.
    - a. Average greater than 1 megohm and less than or equal to 1000 megohms when test specimens are tested surface to ground.
    - b. Average greater than 1 megohm and less than or equal to 1000 megohms when installed floor coverings are tested surface to ground.
  - 2. Static Generation: Less than 100 V when tested per AATCC-134 at 12 percent relative humidity with conductive footwear.
  - 3. Static Decay: 5000 to zero V in less than 0.5 seconds when tested per FED-STD-101C/4046.1.
- B. 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.

### 2.2 STATIC-DISSIPATIVE RESILIENT FLOOR COVERINGS

- A. Static-Dissipative, Vinyl Composition Floor Tile: ASTM F 1066 (vinyl composition floor tile, nonasbestos formulated), Class 2 (through-pattern tile).
  - 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. Armstrong World Industries, Inc.
  - 2. Thickness: Not less than 0.125 inch.
  - 3. Size: 12 by 12 inches.
  - 4. Colors and Patterns: As indicated on Drawings.

### 2.3 INSTALLATION MATERIALS

- A. Static-Control Adhesive: Provided or approved by manufacturer; type that maintains electrical continuity of floor-covering system to ground connection.
  - 1. Adhesives shall have a VOC content of 50 g/L or less.

- B. Grounding Strips: Provided or approved by manufacturer; type and size that maintains electrical continuity of floor-covering system to ground connection.
- C. Maintenance Floor Tiles: Special floor tiles inscribed "Conductive floor. Do not wax."
- D. Floor Polish: Provide protective, static-control liquid floor polish products as recommended by floor-covering manufacturer.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
- 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 or static-control characteristics of floor coverings.
- 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 static-control resilient flooring and electrical continuity of floor-covering systems.
- 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 floor-covering 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 and as follows. Proceed with installation only after substrates pass testing.
    - a. Perform relative-humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have maximum relative-humidity level as directed by manufacturer.
- 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 static-control resilient flooring until it is same temperature as space where it is to be installed.
  - 1. Move static-control resilient flooring and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

- E. Sweep and vacuum substrates to be covered by static-control resilient flooring immediately before installation.

### 3.3 INSTALLATION, GENERAL

- A. Install static-control resilient flooring according to manufacturer's written instructions.
- B. Embed grounding strips in static-control adhesive. Extend grounding strips beyond perimeter of static-control resilient floor-covering surfaces to ground connections.
- C. Scribe, cut, and fit static-control resilient flooring to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
- D. Extend static-control resilient flooring into toe spaces, door reveals, closets, and similar openings. Extend static-control resilient flooring to center of door openings.
- E. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on static-control resilient flooring as marked on substrates. Use chalk or other nonpermanent, nonstaining marking device.
- F. Install static-control resilient flooring on covers for telephone and electrical ducts, and similar items in installation areas. Maintain overall continuity of color and pattern with pieces of static-control resilient flooring installed on covers. Tightly adhere static-control resilient flooring edges to substrates that abut covers and to cover perimeters.
- G. Adhere static-control resilient flooring to substrates using a full spread of static-control 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.

### 3.4 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 floor tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half floor tile at perimeter.
  - 1. Lay floor tiles square with room axis.
- C. Match floor tiles for color and pattern by selecting floor tiles from cartons in same sequence as manufactured and packaged if so numbered. Discard broken, cracked, chipped, or deformed floor tiles.
  - 1. Lay static-dissipative, vinyl composition floor tiles with grain running in one direction.

### 3.5 FIELD QUALITY CONTROL

- A. Testing: Engage a qualified testing agency to test electrical resistance of static-control resilient flooring for compliance with requirements.

1. Arrange for testing after static-control adhesives have fully cured and static-control resilient flooring has stabilized to ambient conditions and after ground connections are completed.
  2. Arrange for testing of static-control resilient flooring before and after performing floor polish procedures.
- B. Static-control resilient flooring will be considered defective if it does not pass tests and inspections.
- C. Prepare test and inspection reports.

### 3.6 CLEANING AND PROTECTION

- A. Comply with manufacturer's written instructions for cleaning and protection of static-control resilient flooring.
- B. Perform the following operations immediately after completing static-control resilient flooring:
1. Remove static-control adhesive and other blemishes from exposed surfaces.
  2. Sweep and vacuum surfaces thoroughly.
  3. Damp-mop surfaces to remove marks and soil.
- C. Protect static-control resilient flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.
1. If recommended in writing by manufacturer, apply protective static-control floor polish formulated to maintain or enhance floor covering's electrical properties; ensure static-control resilient flooring surfaces are free from soil, static-control adhesive, and surface blemishes.
    - a. Verify that both floor polish and its application method are approved by manufacturer and that floor polish will not leave an insulating film that reduces static-control resilient flooring's effectiveness for static control.
- D. Cover static-control resilient flooring until Substantial Completion.

END OF SECTION

## SECTION 09 6623 - 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 and base.

#### 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.

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. 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. Control-joint strips.
  - 3. Accessory strips.
  - 4. Precast terrazzo jointing and edge configurations.
- C. 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-square Samples.
2. Accessories: 6-inch-long Samples of each exposed strip item required.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Material Certificates: For each type of terrazzo material or product, from manufacturer.
- C. Installer Certificates: Signed by manufacturers certifying that installers comply with requirements.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For terrazzo to include in maintenance manuals.

#### 1.8 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. of typical poured-in-place flooring and base condition for each color and pattern in locations directed by Architect.
    - b. Include base.
  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. 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.

1.10 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.

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. 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. Key Resin Company.
    - b. Master Terrazzo Technologies LLC.
    - c. Terrazzo & Marble Supply Companies.
  - 2. Thickness: 3/8 inch nominal.
  - 3. Custom Mix Color and Pattern: Match existing system (three colors).

a. Color Matrix (Anticipated):

1) Matrix 1 – “Canvas Cloth”

CHIPS	% OF MIX	#0	#1	#2
Diablo Blue	20%		66%	34%
Amber Glass	10%		66%	34%
Plum Glass	10%		66%	34%
Mother of Pearl	10%		66%	34%
DMC Botticino	50%		66%	34%

2) Matrix 2 – “Mansard Stone”

CHIPS	% OF MIX	#0	#1	#2
Diablo Blue	60%		66%	34%
Amber Glass	10%		66%	34%
Mother of Pearl	20%		66%	34%
DMC Botticino	10%		66%	34%

3) Matrix 3 – “Lights Out”

CHIPS	% OF MIX	#0	#1	#2
Diablo Blue	60%		66%	34%
Amber Glass	10%		66%	34%
Mother of Pearl	20%		66%	34%
DMC Botticino	10%		66%	34%

B. Materials:

1. Flexible Reinforcing Membrane: Manufacturer's resinous membrane for substrate-crack preparation and reflective-crack reduction.
  - a. Reinforcement: Fiberglass scrim.
2. Primer: Manufacturer's product recommended for substrate and use indicated.
3. Epoxy-Resin Matrix: Manufacturer's standard recommended for use indicated and in colors 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 per ASTM D 638 for a 2-inch specimen made using a "C" die per ASTM D 412.
    - 3) Minimum Compressive Strength: 10,000 psi 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 per ASTM D 635.
  - 2) Thermal Coefficient of Linear Expansion: 0.0025 inch/inch per deg F for temperature range of minus 12 to plus 140 deg F per ASTM D 696.
4. Aggregates: Comply with NTMA gradation standards for mix indicated and contain no deleterious or foreign matter.
  - a. Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131.
  - b. 24-Hour Absorption Rate: Less than 0.75 percent.
  - c. Dust Content: Less than 1.0 percent by weight.
5. Finishing Grout: Resin based.

### 2.3 STRIP MATERIALS

- A. Thin-Set Divider Strips: L-type angle, 1/4 inch deep.
  1. Material: White-zinc alloy.
  2. Top Width: 1/8 inch.
- B. Accessory Strips: Match divider-strip width, material, and color unless otherwise indicated. Use the following types of accessory strips as required to provide a complete installation:
  1. Base-bead strips for exposed top edge of terrazzo base.
  2. Edge-bead strips for exposed edges of terrazzo.

### 2.4 MISCELLANEOUS ACCESSORIES

- A. Strip Adhesive: Epoxy-resin adhesive recommended by adhesive manufacturer for this use.
- 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. Joint Compound: Terrazzo manufacturer's resinous product approved and recommended by manufacturer for application indicated.
- E. Resinous Matrix Terrazzo Cleaner: Chemically neutral cleaner with pH factor between 7 and 10 that is biodegradable, phosphate free, and recommended by sealer manufacturer for use on terrazzo type indicated.
- F. Sealer: Slip- and stain-resistant, penetrating-type sealer that is chemically neutral; does not affect terrazzo color or physical properties; 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. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to manufacturer's written instructions.
  - 1. Moisture Testing: Perform tests indicated below.
    - a. Test Method: Test for moisture content by method recommended in writing by terrazzo manufacturer. Proceed with installation only after substrates pass testing.
- D. 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; noncumulative.
- D. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.
- E. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.
- F. Flexible Reinforcing Membrane:
  - 1. Prepare and prefill substrate cracks with membrane material.
  - 2. Install membrane at substrate cracks in areas to receive terrazzo.
  - 3. Reinforce membrane with fiberglass scrim.
  - 4. Prepare membrane according to manufacturer's written instructions before applying substrate primer.
- G. Primer: Apply to terrazzo substrates according to manufacturer's written instructions.
- H. Strip Materials:
  - 1. Divider Strips:
    - a. Locate divider strips in locations indicated.
    - b. Install strips in adhesive setting bed without voids below strips, or mechanically anchor strips as required to attach strips to substrate, as recommended by strip manufacturer.
  - 2. Accessory Strips: Install as required to provide a complete installation.

### 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.

PINAL COUNTY  
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FLORENCE, ARIZONA

30-15122-00

100% CONSTRUCTION DOCUMENTS

END OF SECTION

## SECTION 09 6813 - TILE CARPETING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes carpet tile and installation to be installed in areas indicated as CPT in Room finish schedule.

#### 1.3 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Include the following:
  - 1. Pattern of installation.
  - 2. Pattern type, location, and direction.
  - 3. Pile direction.
  - 4. Insets and borders.
  - 5. Transition and other accessory strips.
  - 6. Transition details to other flooring materials.
- C. Samples: For each carpet tile and exposed accessory and for each color and pattern required.
- D. Product Schedule: Use same room and product designations indicated on Drawings and in schedules.
- E. Maintenance data.

#### 1.4 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who is certified by the Floor Covering Installation Board or who can demonstrate compliance with its certification program requirements.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI 104, Section 5, "Storage and Handling."

#### 1.6 PROJECT CONDITIONS

- A. General: Comply with CRI 104, Section 6.1, "Site Conditions; Temperature and Humidity."
- B. Environmental Limitations: Do not install carpet tile 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 tile 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.

#### 1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to replace carpet tile that does not comply with requirements or that fails within 10 years from date of Substantial Completion.
  - 1. Warranty does not include deterioration or failure of carpet tile from unusual traffic, failure of substrate, vandalism, or abuse. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.

#### 1.8 EXTRA MATERIALS

- A. Furnish extra materials described below that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  - 1. Carpet Tile: Full-size units equal to 2 percent of amount installed for each type indicated, but totaling not less than 5 sq. yd.

### PART 2 - PRODUCTS

#### 2.1 CARPET TILE

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Atlas Carpet Mills, Inc.
  - 2. Interface, LLC.
  - 3. J&J Invision; J&J Industries, Inc.
  - 4. Mannington Mills, Inc.
  - 5. Mohawk Group (The); Mohawk Carpet, LLC.
  - 6. Shaw Contract Group; a Berkshire Hathaway company.
- B. **CPTT-1: Basis-of-Design Manufacturer: Mohawk Group (The); Lees.**
  - 1. Color and Pattern: As indicated on Drawings
  - 2. Yarn System: Duracolor® Premium Nylon
  - 3. Color System: 100% solution dyed.
  - 4. Construction: Patterned Tip Shear
  - 5. Soil / Stain Protection: Sentry Plus
  - 6. Tufted Weight: 18 oz./yd<sup>2</sup>.
  - 7. Finished Pile Thickness: .098 inches.
  - 8. Gauge: 1/12.
  - 9. Stitches per Inch: 11.
  - 10. Primary Backing: Synthetic.
  - 11. Secondary Backing: EcoFlex ICT.
  - 12. Density: 6612 oz/yd<sup>3</sup>.
  - 13. Tile Size: 12 by 36 inches nominal.

- C. **CPTT-2:** Basis-of-Design Manufacturer: Mohawk Group (The); Lees.
1. Color and Pattern: As indicated on Drawings
  2. Yarn System: Duracolor® Premium Nylon
  3. Color System: 100% solution dyed.
  4. Construction: Patterned Tip Shear
  5. Soil / Stain Protection: Sentry Plus
  6. Tufted Weight: 18 oz./yd<sup>2</sup>.
  7. Finished Pile Thickness: .109 inches.
  8. Gauge: 1/12.
  9. Stitches per Inch: 11.
  10. Primary Backing: Synthetic.
  11. Secondary Backing: EcoFlex ICT.
  12. Density: 5945 oz/yd<sup>3</sup>.
  13. Tile Size: 12 by 36 inches nominal.
- D. **CPTT-5:** Basis-of-Design Manufacturer: Mannington Mills, Inc.
1. Color and Pattern: As indicated on Drawings
  2. Yarn System: Ultron Type 6,6 Nylon.
  3. Construction: Textured Patterned Loop
  4. Soil / Stain Protection: XGUARD
  5. Tufted Weight: 35 oz./yd<sup>2</sup>.
  6. Finished Pile Thickness: .161 inches.
  7. Primary Backing: Synthetic.
  8. Secondary Backing: Infinity Modular
  9. Density: 7826 oz/yd<sup>3</sup>.
  10. Tile Size: 24 by 24 inches nominal.
- E. **CPTT-6:** Basis-of-Design Manufacturer: Interface, LLC.
1. Color and Pattern: As indicated on Drawings
  2. Yarn System: Post-Consumer Content Nylon 6,6.
  3. Color System: 100% solution dyed.
  4. Construction: Tufted Tip-Sheared
  5. Soil / Stain Protection: Protekt<sup>2</sup>®
  6. Tufted Weight: 20 oz./yd<sup>2</sup>.
  7. Finished Pile Thickness: .107 inches.
  8. Gauge: 1/12.
  9. Stitches per Inch: 9.7.
  10. Primary Backing: Synthetic.
  11. Secondary Backing: GlasBac® RE tile.
  12. Density: 6729 oz/yd<sup>3</sup>.
  13. Tile Size: 20 by 20 inches nominal.

- F. **CPTT-7:** Basis-of-Design Manufacturer: Mannington Commercial
1. Color and Pattern: As indicated on Drawings
  2. Yarn System: Ultron Type 6,6 Nylon.
  3. Color System: 100% solution dyed.
  4. Construction: Tip Sheared Loop
  5. Soil / Stain Protection: XGUARD
  6. Tufted Weight: 34 oz./yd<sup>2</sup>.
  7. Finished Pile Thickness: .151 inches.
  8. Gauge: 1/10.
  9. Stitches per Inch: 9.8.
  10. Primary Backing: Synthetic.
  11. Secondary Backing: Infinity Modular Reinforced Composite Closed Cell Polymer.
  12. Density: 8105 oz/yd<sup>3</sup>.
  13. Tile Size: 24 by 24 inches nominal.
- G. **CPTT-8:** Basis-of-Design Manufacturer: Interface, LLC.
1. Color and Pattern: As indicated on Drawings
  2. Yarn System: Post-Consumer Content Nylon 6.6.
  3. Color System: 100% solution dyed.
  4. Construction: Tufted Cut & Loop
  5. Soil / Stain Protection: Protekt<sup>2</sup>®
  6. Tufted Weight: 15 oz./yd<sup>2</sup>.
  7. Finished Pile Thickness: .102 inches.
  8. Gauge: 1/12.
  9. Stitches per Inch: 7.
  10. Primary Backing: Synthetic.
  11. Secondary Backing: GlasBac® RE tile.
  12. Density: 5294 oz/yd<sup>3</sup>.
  13. Tile Size: 20 by 20 inches nominal.
- H. **CPTT-9:** Basis-of-Design Manufacturer: Mannington Commercial
1. Color and Pattern: As indicated on Drawings
  2. Yarn System: Ultron Type 6,6 Nylon.
  3. Color System: 100% solution dyed.
  4. Construction: Tip Sheared Loop
  5. Soil / Stain Protection: XGUARD
  6. Tufted Weight: 34 oz./yd<sup>2</sup>.
  7. Finished Pile Thickness: .151 inches.
  8. Gauge: 1/10.
  9. Stitches per Inch: 9.8.
  10. Primary Backing: Synthetic.
  11. Secondary Backing: Infinity Modular Reinforced Composite Closed Cell Polymer.
  12. Density: 8105 oz/yd<sup>3</sup>.
  13. Tile Size: 24 by 24 inches nominal.

I. **CPTT-10:** Basis-of-Design Manufacturer: Mohawk Group (The); Lees.

1. Color and Pattern: As indicated on Drawings
2. Yarn System: Duracolor® Premium Nylon
3. Color System: 100% solution dyed.
4. Construction: Textured Patterned Loop
5. Soil / Stain Protection: Sentry Plus
6. Tufted Weight: 18 oz./yd<sup>2</sup>.
7. Finished Pile Thickness: .080 inches.
8. Gauge: 1/12.
9. Stitches per Inch: 11.
10. Primary Backing: Synthetic.
11. Secondary Backing: EcoFlex NXT.
12. Density: 7457 oz/yd<sup>3</sup>.
13. Tile Size: 24 by 24 inches nominal.

2.2 INSTALLATION ACCESSORIES

- A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided by or recommended by carpet tile manufacturer.
- B. Adhesive: Manufacturer's standard pre-engineered water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet tile and is recommended by carpet tile manufacturer for releasable installation.
- C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance. Verify that substrates and conditions are satisfactory for carpet tile installation and comply with requirements specified.
- 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 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, and depressions in substrates.
- 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. Damp mop substrates to be covered prior to installing carpet tile. After cleaning, examine substrates for moisture, alkaline salts, carbonation, or dust. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.3 INSTALLATION

- A. Install carpet using pre-engineered adhesive system per manufacturer's written instruction and in similar fashion to CRI 104, Section 13 "Direct Glue-Down Installation."
- B. Installation Method: Where indicated in Room Finish Schedule to receive carpet tiles (CPTT), install as follows:
  - 1. Quarter turn.
- C. Maintain dye lot integrity. Do not mix dye lots in same area.
- D. Do not bridge building expansion joints with carpet.
- E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.
- F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.
- H. Install pattern parallel to walls and borders.

### 3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet tile:
  - 1. Remove surface blemishes using cleaner recommended by carpet tile manufacturer.
  - 2. Remove yarns that protrude from carpet tile surface.
  - 3. Vacuum carpet tile using commercial machine with face-beater element.

- B. Protect installed carpet tile to comply with CRI 104, Section 20, "Protection of Indoor Installations."
- C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION



## SECTION 09 6816 - SHEET CARPETING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Tufted carpet.
- B. Related Requirements:
  - 1. Section 09 6513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet.
  - 2. Section 09 6813 "Tile Carpeting" for modular carpet tiles.

#### 1.3 PREINSTALLATION MEETINGS

- A. Preinstallation Conference: Conduct conference at Project site.
  - 1. Review methods and procedures related to carpet installation including, but not limited to, the following:
    - a. Review delivery, storage, and handling procedures.
    - b. Review ambient conditions and ventilation procedures.
    - c. Review subfloor preparation procedures.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include manufacturer's written data on physical characteristics and durability.
  - 2. Include manufacturer's written installation recommendations for each type of substrate.
- B. Shop Drawings: For carpet installation, showing the following:
  - 1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet.
  - 2. Carpet type, color, and dye lot.
  - 3. Seam locations, types, and methods.
  - 4. Type of subfloor.
  - 5. Type of installation.
  - 6. Pattern type, repeat size, location, direction, and starting point.
  - 7. Pile direction.
  - 8. Types, colors, and locations of insets and borders.

9. Types, colors, and locations of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

C. Samples for Verification: 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: 12-inch-square Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch-long Samples.

D. Product Schedule: For carpet. Use same designations indicated on Drawings.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.
- B. Product Test Reports: For carpet, for tests performed by a qualified testing agency.
- C. Sample Warranties: For special warranties.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For carpet to include in maintenance manuals. Include the following:
  1. Methods for maintaining carpet, 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.

#### 1.7 MAINTENANCE MATERIAL SUBMITTALS

- A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
  1. Carpet: Full-width rolls equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd.

#### 1.8 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

#### 1.9 DELIVERY, STORAGE, AND HANDLING

- A. Comply with CRI's "CRI Carpet Installation Standard."
- B. Deliver carpet in original mill protective covering with mill register numbers and tags attached.

1.10 FIELD CONDITIONS

- A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.
- B. Environmental Limitations: Do not deliver or install carpet until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.
- C. Do not install carpet over concrete slabs until slabs have cured, are sufficiently dry to bond with adhesive, and have pH range recommended by carpet manufacturer.
- D. Where demountable partitions or other items are indicated for installation on top of carpet, install carpet before installing these items.

1.11 WARRANTY

- A. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
  - 1. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
  - 2. Failures include, but are not limited to, the following:
    - a. More than 10 percent loss of face fiber, edge raveling, snags, and runs.
    - b. Loss of tuft bind strength.
    - c. Excess static discharge.
    - d. Delamination.
  - 3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TUFTED CARPET

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Atlas Carpet Mills, Inc.
  - 2. Interface, LLC.
  - 3. J&J Invision; J&J Industries, Inc.
  - 4. Mannington Mills, Inc.
  - 5. Mohawk Group (The); Mohawk Carpet, LLC.
  - 6. Shaw Contract Group; a Berkshire Hathaway company.
- B. **CPT-3**
  - 1. Basis-of-Design Manufacturer: Atlas Carpet Mills, Inc.
  - 2. Color and Pattern: As indicated on Drawings.
  - 3. Fiber Type: Antron® Legacy nylon 6,6.
  - 4. Pile Characteristic: Microweave.

5. Density: 7,579 oz./cu. yd.
6. Stitches: 10 stitches per inch.
7. Gage: 1/12.
8. Face Weight: 30 oz./sq. yd.
9. Primary Backing: Action Bac™.
10. Secondary Backing: Synthetic.
11. Roll Width: 12.5 feet.
12. Applied Treatments:
  - a. Applied Soil-Resistance Treatment: Manufacturer's standard material (Duratech®).
13. Performance Characteristics:
  - a. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.

**C. CPT-4**

1. Basis-of-Design Manufacturer: J&J Invision; J&J Industries, Inc.
2. Color and Pattern: As indicated on Drawings.
3. Fiber Type: Ultron® Nylon BCF.
4. Pile Characteristic: Cut-and-loop pile.
5. Density: 5,883 oz./cu. yd.
6. Stitches: 10 stitches per inch.
7. Gage: 1/10.
8. Face Weight: 34 oz./sq. yd.
9. Primary Backing: PremierBac Plus
10. Secondary Backing: Synthetic.
11. Roll Width: 12 feet.
12. Applied Treatments:
  - a. Applied Soil-Resistance Treatment: Manufacturer's standard material (ProTex®).
13. Performance Characteristics:
  - a. Critical Radiant Flux Classification: Not less than 0.45 W/sq. cm according to NFPA 253.
  - b. Colorfastness to Light: Not less than 4 after 40 AFU (AATCC fading units) according to AATCC 16, Option E.
  - c. Electrostatic Propensity: Less than 3.5 kV according to AATCC 134.

**2.2 INSTALLATION ACCESSORIES**

- A. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet manufacturer.
- B. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance.
- B. Examine carpet for type, color, pattern, and potential defects.
- C. Concrete Slabs On Grade: Verify that finishes comply with requirements specified in Section 03 3000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.
  - 1. Moisture Testing: Perform tests so that each test area does not exceed 1000 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.
    - a. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum relative humidity level measurement as required by carpet and adhesive manufacturer.
    - b. Perform additional moisture tests recommended in writing by adhesive and carpet manufacturers. Proceed with installation only after substrates pass testing.
- D. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 PREPARATION

- A. General: Comply with CRI's "CRI Carpet Installation Standard" and with carpet manufacturer's written installation instructions for preparing substrates.
- B. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet manufacturers.
- C. Broom and vacuum clean substrates to be covered immediately before installing carpet.

#### 3.3 CARPET INSTALLATION

- A. Comply with CRI's "CRI Carpet Installation Standard" and carpet manufacturer's written installation instructions for the following:
  - 1. Direct-glue-down installation.
  - 2. Stair installation.
- B. Comply with carpet manufacturer's written instructions and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.

- C. Install pattern parallel to walls and borders.
- D. Do not bridge building expansion joints with carpet.
- E. Cut and fit carpet 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 manufacturer.
- F. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.
- G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet as marked on subfloor. Use nonpermanent, nonstaining marking device.

### 3.4 CLEANING AND PROTECTION

- A. Perform the following operations immediately after installing carpet:
  - 1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
  - 2. Remove yarns that protrude from carpet surface.
  - 3. Vacuum carpet using commercial machine with face-beater element.
- B. Protect installed carpet to comply with CRI's "CRI Carpet Installation Standard."
- C. Protect carpet against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods recommended in writing by carpet manufacturer and carpet adhesive manufacturer.

END OF SECTION

## SECTION 09 7723 - FABRIC-WRAPPED PANELS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section includes shop-fabricated, fabric-wrapped wall panels.
- B. Related Sections:
  - 1. Section 09 8433 "Sound-Absorbing Wall Units" for shop-fabricated, acoustical wall panels tested for acoustical performance.

#### 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 fabric facing, panel edge, core material, and mounting indicated.
- B. Shop Drawings: For panel assembly and installation.
  - 1. Include plans, elevations, sections, and mounting devices and details.
  - 2. Include details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge profile and core materials.
  - 3. Include details at cutouts and penetrations for other work.
  - 4. Include direction of fabric weave and pattern matching.
- C. Samples for Verification: For the following products:
  - 1. Fabric: Full-width by approximately 36-inch-long Sample, but not smaller than required to show complete pattern repeat, from dye lot to be used for the Work, and with specified treatments applied. Mark top and face of fabric.
  - 2. Core Material: 12-inch-square Sample at corner.
  - 3. Mounting Devices: Full-size Samples.
  - 4. Assembled Panels: Approximately 36 by 36 inches, including joints and mounting methods, with finished panel edge condition.

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Elevations and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Electrical outlets, switches, and thermostats.
  - 2. Items penetrating or covered by panels including the following:
    - a. Lighting fixtures.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Alarms.
    - e. Sprinklers.
    - f. Access panels.
- B. Product Certificates: For each type of panel.
- C. Sample Warranty: For manufacturer's special warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of panel to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal instructions.

#### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and panel manufacturers' written instructions for minimum and maximum temperature and humidity requirements for shipment, storage, and handling.
- B. Deliver materials and panels in unopened bundles and store in a temperature-controlled dry place with adequate air circulation.

#### 1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not install panels 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. Lighting: Do not install panels until a permanent level of lighting is provided on surfaces to receive the panels.
- C. Air-Quality Limitations: Protect panels from exposure to airborne odors such as tobacco smoke, and install panels under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify panel locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

## 1.9 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace panels and components that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Fabric sagging, distorting, or releasing from panel edge.
    - b. Warping of core.
  - 2. Warranty Period: Two years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain fabric-wrapped wall panels from single source from single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Panels shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
  - 1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; 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: 450 or less.
  - 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.

### 2.3 FABRIC-WRAPPED WALL PANELS

- A. Fabric-Wrapped Wall Panel: Manufacturer's standard panel construction consisting of facing material laminated to front face, edges, and back edge border of core.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Acoustical Panel Systems (APS, Inc.).
    - b. Acoustical Solutions, Inc.
    - c. Conwed Designscape; an Owens Corning company.
    - d. Decoustics Limited; a Saint Gobain company.
    - e. Golterman & Sabo.
    - f. Lamvin, Inc.
    - g. Panel Solutions, Inc.
    - h. Sound Concepts Canada, Inc.
    - i. Wall Technology, Inc.; an Owens Corning company.

2. Panel Shape: Flat.
3. Mounting: Back mounted with manufacturer's standard metal clips or bar hangers, secured to substrate.
4. Core: Glass-fiber board.
5. Edge Construction: Manufacturer's standard chemically hardened core with no frame.
6. Edge Profile: Square.
7. Corner Detail in Elevation: Square with continuous edge profile indicated.
8. Facing Material: As indicated on Drawings.
9. Nominal Core Thickness and Overall System NRC: Minimum 1-1/2 inches and not less than NRC .90 per ASTM C 423.
10. Panel Size: As indicated on Drawings.

## 2.4 MATERIALS

- A. Core Materials:
  1. Glass-Fiber Board: ASTM C 612; of type standard with manufacturer; nominal density of 6 to 7 lb/cu. ft., unfaced, and dimensionally stable, molded rigid board; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.
- B. Facing Material: Fabric from same dye lot; color and pattern as indicated on Drawings.
- C. Mounting Devices: Concealed on back of panel, recommended by manufacturer to support weight of panel, and as follows:
  1. Metal Clips or Bar Hangers: Manufacturer's standard two-part metal "Z" clips, with one part of each clip mechanically attached to back of panel and the other part to substrate, designed to permit unit removal.

## 2.5 FABRICATION

- A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.
- B. Edge Hardening: For glass-fiber board cores, chemically harden core edges and areas of core where mounting devices are attached.
- C. Facing Material: Apply fabric fully covering visible surfaces of panel; with material stretched straight, on the grain, tight, square, and free from puckers, ripples, wrinkles, sags, blisters, seams, adhesive, or other visible distortions or foreign matter.
  1. Square Corners: Tailor corners. Heat-seal vinyl fabric seams at corners.
  2. Fabrics with Directional or Repeating Patterns or Directional Weave: Mark fabric top and attach fabric in same direction so pattern or weave matches in adjacent panels.
- D. Dimensional Tolerances of Finished Panels: Plus or minus 1/16 inch for the following:
  1. Thickness.
  2. Edge straightness.
  3. Overall length and width.
  4. Squareness from corner to corner.

5. Chords, radii, and diameters.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine fabric, fabricated panels, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting panel performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Install panels in locations indicated. Unless otherwise indicated, install panels with vertical surfaces and edges plumb, top edges level and in alignment with other panels, faces flush, and scribed to fit adjoining work accurately at borders and at penetrations.
- B. Comply with manufacturer's written instructions for installation of panels using type of mounting devices indicated. Mount panels securely to supporting substrate.

#### 3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch in 48 inches, noncumulative.
- B. Variation of Joint Width: Not more than 1/16 inch wide from panel edge in 48 inches, noncumulative.

#### 3.4 CLEANING

- A. Clip loose threads; remove pills and extraneous materials.
- B. Clean panels on completion of installation to remove dust and other foreign materials according to manufacturer's written instructions.

END OF SECTION



## SECTION 09 8100 - ACOUSTIC INSULATION

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes unfaced sound attenuation batts in walls and ceilings.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of insulation product specified.
- B. Product Test Reports: From and based on tests performed by qualified independent testing laboratory evidencing compliance of fire performance characteristics, and other properties, based on comprehensive testing of current products.

#### 1.4 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Provide insulation materials identical to those whose indicated fire performance characteristics have been determined per the ASTM test method indicated below, by UL or other testing and inspecting organizations acceptable to authorities having jurisdiction. Identify products with appropriate markings of applicable testing and inspecting organization.
  1. Surface Burning Characteristic: ASTM E 84.
  2. Fire Resistance Ratings: ASTM E 119.
  3. Combustion Characteristics: ASTM E 136.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Protect insulation materials from physical damage and from deterioration by moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's recommendations for handling, storage, and protection during installation.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide insulation products of one of the following:

1. Manufacturers of Glass Fiber Wall Insulation:
  - a. Johns Manville Insulations (SG Series Spin-Glas, 3" thick).
  - b. Owens/Corning Fiberglas Corp. (EcoTouch Sound Attenuation Batts, 3-1/2" thick).
  - c. CertainTeed Corp. (AcoustaTherm Batts, 3-1/2" thick).
2. Manufacturers of Glass Fiber Ceiling Batts:
  - a. Manville (SG Series Spin-Glas, 3" thick).
  - b. Owens/Corning (EcoTouch Sound Attenuation Batts, 3-1/2" thick).
  - c. CertainTeed (CertaSound Acoustical Ceiling Batts, 3-1/2" thick).

## 2.2 MATERIALS

- A. Sound Attenuation Batts: Fiberglass, unfaced, with a Fire Hazard Classification of 250-50 or less when tested in accordance with ASTM E 84, Standard Test Method for Surface Burning Characteristics of Building Materials; ASTM C 665 Standard Specification for Mineral Fiber Blanket Thermal Insulation, Type 1, Class B, and Federal Specification HH-I-521F, Type I.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Comply with insulation manufacturer's instructions applicable to products and application indicated. If printed instructions are not available or do not apply to project conditions, consult manufacturer's technical representative for specific recommendations before proceeding with installation of insulation.
- B. Extend insulation full thickness as indicated to envelop entire area to be insulated. Cut and fit tightly around obstructions, and fill voids with insulation. Remove projections that interfere with placement.
  1. Install acoustical insulation batts in stud partition walls where shown. Install batts prior to installing gypsum panels unless batts are readily installed after panels have been installed on one side.
  2. Install ceiling batts as detailed, where shown on Drawings.

END OF SECTION

## SECTION 09 8433 - 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, acoustical panel units tested for acoustical performance, including the following:
  - 1. Sound-absorbing wall panels.
- B. Related Requirements:
  - 1. Section 09 7723 "Fabric-Wrapped Panels" for decorative, fabric-wrapped wall panels that are not required to be tested for acoustical performance.

#### 1.3 DEFINITIONS

- A. NRC: Noise Reduction Coefficient.
- B. SAA: Sound Absorption Average.

#### 1.4 PREINSTALLATION MEETINGS

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

#### 1.5 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include panel edge, core material, and mounting indicated.
- B. Shop Drawings: For unit assembly and installation.
  - 1. Include plans, elevations, sections, and mounting devices and details.
  - 2. Include details at panel head, base, joints, and corners; and details at ceiling, floor base, and wall intersections. Indicate panel edge profile and core materials.
  - 3. Include details at cutouts and penetrations for other work.
- C. Samples for Verification: For the following products:
  - 1. Panel Edge: 12-inch- long Sample(s) showing each edge profile, corner, and finish.
  - 2. Mounting Devices: Full-size Samples.

3. Assembled Panels: Approximately 36 by 36 inches, including joints and mounting methods.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Elevations and other details, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  1. Electrical outlets, switches, and thermostats.
  2. Items penetrating or covered by units including the following:
    - a. Lighting fixtures.
    - b. Air outlets and inlets.
    - c. Speakers.
    - d. Alarms.
    - e. Sprinklers.
    - f. Access panels.
    - g. Equipment mounts.
  3. Show operation of hinged and sliding components covered by or adjacent to units.
- B. Product Certificates: For each type of unit.
- C. Sample Warranty: For manufacturer's special warranty.

#### 1.7 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of unit to include in maintenance manuals. Include fabric manufacturers' written cleaning and stain-removal instructions.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Comply with fabric and 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.

#### 1.9 FIELD CONDITIONS

- A. Environmental Limitations: Do not install 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. Lighting: Do not install units until a permanent level of lighting is provided on surfaces to receive the units.

- C. Air-Quality Limitations: Protect units from exposure to airborne odors, such as tobacco smoke, and install units under conditions free from odor contamination of ambient air.
- D. Field Measurements: Verify unit locations and actual dimensions of openings and penetrations by field measurements before fabrication, and indicate them on Shop Drawings.

#### 1.10 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace units and components that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to the following:
    - a. Acoustical performance.
    - b. Warping of units.
  - 2. Warranty Period: Two years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Source Limitations: Obtain wall units specified in this Section from single source from single manufacturer.

#### 2.2 PERFORMANCE REQUIREMENTS

- A. Fire-Test-Response Characteristics: Units shall comply with "Surface-Burning Characteristics" or "Fire Growth Contribution" Subparagraph below, or both, as determined by testing identical products by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:
  - 1. Surface-Burning Characteristics: Comply with ASTM E 84 or UL 723; 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: 450 or less.
  - 2. Fire Growth Contribution: Comply with acceptance criteria of local code and authorities having jurisdiction when tested according to NFPA 265 Method B Protocol or NFPA 286.

#### 2.3 SOUND-ABSORBING WALL UNITS

- A. Sound-Absorbing Wall Panel: Manufacturer's standard panel construction consisting of facing material laminated to front face and edges of core.
- B. Basis-of-Design Product: Subject to compliance with requirements, provide Armstrong World Industries; Soundscapes, Optima Panels.

1. Requests for substitutions will be considered in accordance with the provisions of Invitation for Bids Packet.
2. Finish Color at Exposed Edges: As selected by Architect from manufacturer's full range.
3. Mounting: Back mounted with manufacturer's standard metal clips or bar hangers, secured to substrate.
4. Core: Glass-fiber.
  - a. Core-Face Layer: Manufacturer's standard acoustically transparent, washable membrane.
5. Edge Profile: Square.
6. Corner Detail in Elevation: Square with continuous edge profile indicated.
7. Acoustical Performance: Sound absorption NRC of 0.80 according to ASTM C 423 for Type A mounting according to ASTM E 795.
8. Nominal Overall Panel Thickness: 1 inch.
9. Panel Size: As indicated on Drawings.

## 2.4 MATERIALS

### A. Core Materials:

1. Glass-Fiber Board: ASTM C 612; of type standard with manufacturer, faced with washable film overlay, and dimensionally stable, molded rigid board; and with maximum flame-spread and smoke-developed indexes of 25 and 50, respectively.

### B. Mounting Devices: Concealed on back of unit, recommended by manufacturer to support weight of unit, and as follows:

1. Metal Clips or Bar Hangers: Manufacturer's standard two-part metal "Z" clips, with one part of each clip mechanically attached to back of unit and the other part to substrate, designed to permit unit removal.

## 2.5 FABRICATION

### A. Standard Construction: Use manufacturer's standard construction unless otherwise indicated; with facing material applied to face, edges, and back border of dimensionally stable core; and with rigid edges to reinforce panel perimeter against warpage and damage.

### B. Dimensional Tolerances of Finished Units: Plus or minus 1/16 inch for the following:

1. Thickness.
2. Edge straightness.
3. Overall length and width.
4. Squareness from corner to corner.
5. Chords, radii, and diameters.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine fabric, fabricated units, substrates, areas, and conditions for compliance with requirements, installation tolerances, and other conditions affecting unit performance.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. Install units in locations indicated. Unless otherwise indicated, install units 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 manufacturer's written instructions for installation of units using type of mounting devices indicated. Mount units securely to supporting substrate.

3.3 INSTALLATION TOLERANCES

- A. Variation from Plumb and Level: Plus or minus 1/16 inch in 48 inches, noncumulative.
- B. Variation of Joint Width: Not more than 1/32-inch variation from hairline in 48 inches, noncumulative.

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



SECTION 09 9100 - PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes surface preparation and field painting of the following:
1. Exposed exterior items and surfaces, not covered in Section 09 9600 "High-Performance Coatings" or Section 09 9610 "Electrostatic Coatings."
  2. Exposed interior items and surfaces, not covered in Section 09 9600 "High-Performance Coatings."
  3. Surface preparation, priming, and finish coats specified in this Section are in addition to shop priming and surface treatment specified in other Sections.
- B. Paint exposed surfaces, except where the paint schedules indicate that a surface or material is not to be painted or is to remain natural. If the paint schedules do not specifically mention an item or a surface, paint the item or surface the same as similar adjacent materials or surfaces whether or not schedules indicate colors. If the schedules do not indicate color or finish, the Architect will select from standard colors and finishes available.
1. Painting includes field painting of exposed bare and covered pipes and ducts (including color coding), hangers, exposed steel and iron work, and primed metal surfaces of mechanical and electrical equipment.
- C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels.
1. Prefinished items include the following factory-finished components:
    - a. Acoustical wall panels.
    - b. Finished mechanical and electrical equipment.
    - c. Light fixtures.
    - d. Distribution cabinets.
  2. Concealed surfaces include walls or ceilings in the following generally inaccessible spaces:
    - a. Foundation spaces.
    - b. Furred areas.
    - c. Ceiling plenums.
    - d. Utility tunnels.
    - e. Pipe spaces.
    - f. Duct shafts.
  3. Finished metal surfaces include the following:
    - a. Anodized aluminum.
    - b. Stainless steel.
    - c. Chromium plate.
    - d. Copper.
    - e. Bronze and brass.

4. Operating parts include moving parts of operating equipment and the following:
  - a. Valve and damper operators.
  - b. Linkages.
  - c. Sensing devices.
  - d. Motor and fan shafts.
5. Labels: Do not paint over Underwriters Laboratories (UL), Factory Mutual (FM), or other code-required labels or equipment name, identification, performance rating, or nomenclature plates.

### 1.3 DEFINITIONS

- A. General: Standard coating terms defined in ASTM D 16 apply to this Section.
- B. Gloss Levels:
  1. Gloss Level 1 (Flat): Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
  2. Gloss Level 2 (Velvet): Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
  3. Gloss Level 3 (Eggshell): 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
  4. Gloss Level 4 (Low Sheen): 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
  5. Gloss Level 5 (Semi-Gloss): 35 to 70 units at 60 degrees, according to ASTM D 523.
  6. Gloss Level 6 (Gloss): 70 to 85 units at 60 degrees, according to ASTM D 523.
  7. Gloss Level 7 (High Gloss): More than 85 units at 60 degrees, according to ASTM D 523.

### 1.4 ACTION SUBMITTALS

- A. Product Data: For each paint system specified. Include block fillers and primers.
  1. Material List: Provide an inclusive list of required coating materials. Indicate each material and cross-reference specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
  2. Manufacturer's Information: Provide manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each coating material proposed for use.
  3. Certification by the manufacturer that products supplied comply with local regulations controlling use of volatile organic compounds (VOCs).
  4. MPI listing for each component of painting system.
- B. Samples for Verification: Of each color and material to be applied, with texture to simulate actual conditions, on representative Samples of the actual substrate.
  1. Provide Samples of each color defining each separate coat, including block fillers and primers. Use representative colors when preparing Samples for review. Resubmit until required sheen, color, and texture are achieved.
  2. Submit two draw-downs (8-1/2" x 11") of each color and finish gloss.

## 1.5 CLOSEOUT SUBMITTALS

- A. At completion of Work of this Section, submit the following schedules for inclusion in O&M Manuals.
  - 1. System description for system used on each substrate.
  - 2. Color and sheen.
  - 3. Material safety data sheets.
  - 4. Care and maintenance instructions for painted surfaces.

## 1.6 QUALITY ASSURANCE

- A. Source Limitations: Obtain block fillers, primers, and undercoat materials for each coating system from the same manufacturer as the finish coats.
- B. Coordination of Work: Review other Sections in which primers are provided to ensure compatibility of the total systems for various substrates. On request, furnish information on characteristics of finish materials to ensure use of compatible primers.
  - 1. Notify Architect of problems anticipated using the materials specified.
- C. Field Samples, Interior: Provide a full-coat benchmark finish sample of each type of coating and substrate required on the Project. Comply with procedures specified in PDCA P5. Duplicate finish of approved prepared samples.
  - 1. The Architect will select one room or surface to represent surfaces and conditions for each type of coating and substrate to be painted. Apply coatings in this room or surface in accordance with the schedule or as specified. After finishes are accepted, this room or surface will be used for evaluation of coating systems of a similar nature.
- D. Material Quality: Provide the manufacturer's best quality, top of the line paint material of the various coating types specified. Paint material containers not displaying manufacturer's product identification will not be acceptable.
- E. Ethylene Glycol: All paint products for this Project shall be ethylene glycol free.

## 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the Project Site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label, and the following information:
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
  - 1. Protect from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and application.

## 1.8 PROJECT CONDITIONS

- A. Apply water-based paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 50 and 90 deg F.

- B. Apply solvent-thinned paints only when the temperature of surfaces to be painted and surrounding air temperatures are between 45 and 95 deg F.
- C. Do not apply paint in snow, rain, fog, or mist; or when the relative humidity exceeds 85 percent; or at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
  - 1. Painting may continue during inclement weather if surfaces and areas to be painted are enclosed and heated within temperature limits specified by manufacturer during application and drying periods.

## 1.9 EXTRA MATERIALS

- A. Furnish extra paint materials from the same production run as the materials applied in the quantities described below. Package paint materials in unopened, factory-sealed containers for storage and identify with labels describing contents. Deliver extra materials to the Owner.
  - 1. Quantity: Furnish the Owner with 1 gallons of each color or type applied.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide products manufactured by one of the following:
  - 1. Pittsburgh Paint; PPG Industries, Inc.
  - 2. Glidden Professional.
  - 3. Frazee Industries.
  - \* 4. Dunn-Edwards.
  - 5. Sherwin Williams.
- \* **Note:** This Specification is based on products manufactured by Dunn-Edwards Paints to establish the performance, quality and appearance desired for this Project.

### 2.2 PAINT MATERIALS, GENERAL

- A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."
- B. Material Compatibility: Provide block fillers, primers, undercoats, and finish-coat materials that are compatible with one another and the substrates indicated under conditions of service and application, as demonstrated by manufacturer based on testing and field experience.

2.3 BLOCK FILLERS

- A. Block Filler, Latex, Interior/Exterior: Dunn-Edwards, Smooth Blocfil Select SBSL00 Smooth Block Filler, MPI #4.

1. Physical Properties:

Physical Properties	Spec
Resin Type	Modified Copolymer
Solids by Volume	50.5% +/- 2%
EG Free	Yes
Composition by Weight Pigment-61.5% *Prime pigments..... 1.8 Reinforcing pigments ..... 59.7 *Prime pigments include titanium dioxide (TiO <sub>2</sub> ), plus all other pigments directly adding to the hiding power of this paint.	Vehicle-38.5% Acrylic resins ..... 7.8 Water & additives ..... 30.7
VOC	50 g/L
RAVOC	35 g/L

2. Testing:

Test	Results
Topcoat Adhesion per ASTM D 3359 Method B	Minimum #3
Alkali Resistance per MPI #4 Detailed Performance Standard	No signs of blistering, lifting, wrinkling, disintegrating or more than slight color change compared to unexposed

2.4 PRIMERS/SEALERS

- A. Primer Sealer, Latex, Interior: Vinylastic Plus VNPL00.

1. Physical Properties:

Physical Properties	Spec
Resin Type	Acrylic Copolymer
Solids by Volume	27.8% +/- 2%
Composition by Weight Pigment-38.9% *Prime pigments..... 6.0 Reinforcing pigments ..... 32.9 *Prime pigments include titanium dioxide (TiO <sub>2</sub> ), plus all other pigments directly adding to the hiding power of this paint.	Vehicle-61.1% Acrylic resins ..... 6.1 Water & additives ..... 55.0
VOC	95 g/L
RAVOC	50 g/L

- B. Primer, Alkyd, Anti-Corrosive for Metal: Bloc-Rust BRPR00-1 Series, MPI #107.  
 1. Physical Properties:

Physical Properties	Spec
Resin Type	Waterborne alkyd
Solids by Volume	42% +/- 2"
EG Free	Yes
Composition by Weight (BRPR00-1-RO) – Red Oxide Pigment-30.1% *Prime pigments..... 6.6 Rust inhibitive pigments..... 5.6 Reinforcing pigments ..... 17.9	Vehicle-69.9% Alkyd resins ..... 22.8 Water & additives ..... 47.1
Composition by Weight (BRPR00-1-WH) – White Pigment-34.8% *Prime pigments..... 12.5 Rust inhibitive pigments..... 5.4 Reinforcing pigments ..... 16.9	Vehicle-65.2% Alkyd resins ..... 20.6 Water & additives ..... 44.6
*Prime pigments include titanium dioxide (TiO <sub>2</sub> ), plus all other pigments directly adding to the hiding power of this paint.	
VOC	30 g/L
RAVOC	15 g/L

- C. Primer, Latex, Interior Wood: Ultra-Grip® Select UGSL00, MPI #39.  
 1. Physical Properties

Physical Properties	Spec
Resin Type	Acrylic
Solids by Volume	37% +/- 2"
EG Free	Yes
Composition by Weight Pigment-34.5% *Prime pigments..... 10.1 Reinforcing pigments ..... 24.4	Vehicle-65.5% Alkyd resins ..... 13.0 Water & additives ..... 52.5
*Prime pigments include titanium dioxide (TiO <sub>2</sub> ), plus all other pigments directly adding to the hiding power of this paint.	
VOC	45 g/L
RAVOC	35 g/L

- D. Primer, Latex, for Interior Wood: Dunn-Edwards Ultra-Grip Premium UGPR00-1, MPI #39.  
 1. Physical Properties:

Physical Properties	Spec
Resin Type	Acrylic
Solids by Volume	41% +/- 2%
EG Free	Yes
Composition by Weight Pigment-27.8% *Prime pigments..... 15.1 Reinforcing pigments ..... 12.7 *Prime pigments include titanium dioxide (TiO <sub>2</sub> ), plus all other pigments directly adding to the hiding power of this paint.	Vehicle-72.2% Alkyd resins ..... 22.8 Water & additives ..... 49.4
VOC	50 g/L
RAVOC	20 g/L

2.5 WATER BASED PAINTS

- A. 100% Acrylic, Low Sheen (Gloss Level 3): Dunn-Edwards, Spartashield SSSL30. MPI #161.  
 1. Physical Properties:

Physical Properties	Spec
Resin Type	100% Acrylic
Solids by Volume	38% +/-2%
EG Free	Yes
VOC	50 g/L
RAVOC	30 g/L
Conforms to	LEED 2009 IEQ Credit 4.2
Certificates	Bio-Pruf™

2. Testing:

Test	Results
Scrubability	4,000 scrubs with no breakthrough of the film and loss of no more than 20% of the original gloss
Hide per ASTM D2805	Rating of 98 or higher
Chemical Resistance per MPI #161 Detailed Performance Standard	No signs of lifting, wrinkling, or disintegration
EPR	

- B. 100% Acrylic, Semi-Gloss, (Gloss Level 5): Dunn-Edwards, Evershield EVSH50; MPI # 153.  
 1. Physical Properties:

Physical Properties	Spec
Resin Type	100% Acrylic
Solids by Volume	36% +/- 2%
EG Free	Yes
Composition by Weight Pigment-23.9% *Prime pigments..... 22.7 Reinforcing pigments ..... 1.2 *Prime pigments include titanium dioxide (TiO <sub>2</sub> ), plus all other pigments directly adding to the hiding power of this paint.	Vehicle-76.1% Acrylic resins ..... 22.0 Water & additives ..... 54.1
VOC	50 g/L
RAVOC	25 g/L

2. Testing:

Test	Results
Scrubability per MPI #153 Detailed Performance Standard	4,000 Scrubs with no breakthrough of film
Hide per ASTM D2805	Rating of 98 or higher
EPR	3.0

- C. Latex, Interior/Exterior, Low Sheen, (Gloss Level 4): Dunn-Edwards Evershield EVSH40-1, MPI #43.

1. Physical Properties:

Physical Properties	Spec
Resin Type	100% Acrylic
Solids by Volume	36% +/- 2%
EG Free	Yes
Composition by Weight Pigment-27.5% *Prime pigments..... 20.3 Reinforcing pigments ..... 7.2 *Prime pigments include titanium dioxide (TiO <sub>2</sub> ), plus all other pigments directly adding to the hiding power of this paint.	Vehicle-72.5% Alkyd resins ..... 19.9 Water & additives ..... 52.6
VOC	230 g/L
RAVOC	130 g/L

2. Testing.

Test	Results
Scrubability per MPI #43 Detailed Performance Standard	2,000 Scrubs with no breakthrough of film
Hide per ASTM D2805	Rating of 98 or higher
EPR	0.5

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with the Applicator present, under which painting will be performed for compliance with paint application requirements.
  - 1. Do not begin to apply paint until unsatisfactory conditions have been corrected and surfaces receiving paint are thoroughly dry.
  - 2. Start of painting will be construed as the Applicator's acceptance of surfaces and conditions within a particular area.

3.2 PREPARATION

- A. General: Remove hardware and hardware accessories, plates, machined surfaces, lighting fixtures, and similar items already installed that are not to be painted. If removal is impractical or impossible because of the size or weight of the item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
- B. Cleaning: Before applying paint or other surface treatments, clean the substrates of substances that could impair the bond of the various coatings. Remove oil and grease before cleaning.
  - 1. Schedule cleaning and painting so dust and other contaminants from the cleaning process will not fall on wet, newly painted surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be painted according to manufacturer's written instructions for each particular substrate condition and as specified.
  - 1. Provide barrier coats over incompatible primers or remove and reprime.
  - 2. Cementitious Materials: Prepare concrete, concrete masonry block, cement plaster, and mineral-fiber-reinforced cement panel surfaces to be painted. Remove efflorescence, chalk, dust, dirt, grease, oils, and release agents. Roughen as required to remove glaze. If hardeners or sealers have been used to improve curing, use mechanical methods of surface preparation.
    - a. Use abrasive blast-cleaning methods if recommended by paint manufacturer.
    - b. Determine alkalinity and moisture content of surfaces by performing appropriate tests. If surfaces are sufficiently alkaline to cause the finish paint to blister and burn, correct this condition before application. Do not paint surfaces where moisture content exceeds that permitted in manufacturer's written instructions.

3. Ferrous Metals: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with the Steel Structures Painting Council's (SSPC) recommendations.
    - a. Treat bare and sandblasted or pickled clean metal with a metal treatment wash coat before priming.
    - b. Touch up bare areas and shop-applied prime coats that have been damaged. Wire-brush, clean with solvents recommended by paint manufacturer, and touch up with the same primer as the shop coat.
  4. Galvanized Surfaces: Clean galvanized surfaces with nonpetroleum-based solvents so surface is free of oil and surface contaminants. Remove pretreatment from galvanized sheet metal fabricated from coil stock by mechanical methods.
- D. Materials Preparation: Mix and prepare paint materials according to manufacturer's written instructions.
1. Maintain containers used in mixing and applying paint in a clean condition, free of foreign materials and residue.
  2. Stir material before application to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into material. If necessary, remove surface film and strain material before using.
  3. Use only thinners approved by paint manufacturer and only within recommended limits.

### 3.3 APPLICATION

- A. General: Apply paint according to manufacturer's written instructions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint colors, surface treatments, and finishes are indicated in the Schedules following.
  2. Provide finish coats that are compatible with primers used.
  3. The number of coats and film thickness required is the same regardless of the application method. Do not apply succeeding coats until the previous coat has cured as recommended by the manufacturer. Sand between applications where sanding is required to produce an even smooth surface in accordance with the manufacturer's directions.
  4. Apply additional coats when undercoats, stains, or other conditions show through final coat of paint until paint film is of uniform finish, color, and appearance. Give special attention to ensure that surfaces, including edges, corners, crevices, welds, and exposed fasteners, receive a dry film thickness equivalent to that of flat surfaces.
  5. The term "exposed surfaces" includes areas visible when permanent or built-in fixtures, convector covers, covers for finned-tube radiation, grilles, and similar components are in place. Extend coatings in these areas, as required, to maintain the system integrity and provide desired protection.
  6. Paint surfaces behind movable equipment and furniture the same as similar exposed surfaces. Before the final installation of equipment, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  7. Paint interior surfaces of ducts with a flat, nonspecular black paint where visible through registers or grilles.
  8. Paint back sides of access panels and removable or hinged covers to match exposed surfaces.
  9. Finish exterior doors on tops, bottoms, and side edges the same as exterior faces.

- B. Scheduling Painting: Apply first coat to surfaces that have been cleaned, pretreated, or otherwise prepared for painting as soon as practicable after preparation and before subsequent surface deterioration.
- C. Minimum Coating Thickness: Apply paint materials no thinner than manufacturer's recommended spreading rate. Provide the total dry film thickness of the entire system as recommended by the manufacturer.
- D. Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to items exposed in equipment rooms and in occupied spaces.
- E. Mechanical items to be painted include, but are not limited to, the following:
  - 1. Piping, pipe hangers, and supports.
  - 2. Heat exchangers.
  - 3. Tanks.
  - 4. Ductwork.
  - 5. Insulation.
  - 6. Motors and mechanical equipment.
  - 7. Accessory items.
- F. Electrical items to be painted include, but are not limited to, the following:
  - 1. Conduit and fittings.
  - 2. Switchgear.
  - 3. Panelboards.
  - 4. Public announcement system speaker grilles (provided by separate Technology Systems and Equipment Contractor).
- G. Block Fillers: Apply block fillers to concrete masonry block at a rate to ensure complete coverage with pores filled. Refer to Paragraph 3.6 below for PDCA definitions.
- H. Prime Coats: Before applying finish coats, apply a prime coat of material, as recommended by the manufacturer, to material that is required to be painted or finished and that has not been prime coated by others. Recoat primed and sealed surfaces where evidence of suction spots or unsealed areas in first coat appears, to ensure a finish coat with no burn through or other defects due to insufficient sealing.
- I. Pigmented (Opaque) Finishes: Completely cover surfaces as necessary to provide a smooth, opaque surface of uniform finish, color, appearance, and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections will not be acceptable.
- J. Completed Work: Match approved samples for color, texture, and coverage. Remove, refinish, or repaint work not in compliance with specified requirements.

### 3.4 CLEANING

- A. Cleanup: At the end of each workday, remove empty cans, rags, rubbish, and other discarded paint materials from the site.
  - 1. After completing painting, clean glass and paint-spattered surfaces. Remove spattered paint by washing and scraping. Be careful not to scratch or damage adjacent finished surfaces.

### 3.5 PROTECTION

- A. Protect work of other trades, whether being painted or not, against damage by painting. Correct damage by cleaning, repairing or replacing, and repainting, as approved by Architect.
- B. Provide "Wet Paint" signs to protect newly painted finishes. Remove temporary protective wrappings provided by others to protect their work after completing painting operations.
  - 1. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces. Comply with procedures specified in PDCA Standard P1-92 "Touch-Up Painting and Damage Repair - Financial Responsibility."

### 3.6 LEVELS OF BLOCK FILLER: Technical Paper P12-05 as published by the Painting and Decorating Contractors of America (PDCA).

- A. Level 1 – Economy Fill: Reduces quantity of paint required for succeeding paint coats. Reduces some irregularity in masonry profile depth. This level is typically for spaces not occupied by the public. Apply at spreading rate recommended by the manufacturer.
- B. Level 2 – Standard Fill: One coat applied with equipment specified by the coating manufacturer. Backroll as necessary to fill deep irregularities. Masonry profile depth, slightly reduced. Joints, visible as tooled. Number of voids will be minimized, but voids may remain depending on porosity of block. A maximum of ten voids per square foot of surface area shall be deemed to be acceptable. The block filler shall be applied at the spreading rate recommended by the manufacturer. This level is normally used in finished areas that are occupied by the public.

### 3.7 Level 3 – Premium Fill: One or multiple coats of high performance block filler manufactured to be applied at a high dry film build. Backroll block filler to eliminate voids and reduce the majority of masonry profile depth. This system, with an appropriate paint finishing system, produces a surface that is easier to clean to meet health regulations. Exterior use of this level of block filler, with an appropriate paint finishing system, will reduce water intrusion at exterior walls.

### 3.8 EXTERIOR LOCATIONS

- A. Exterior Concrete Masonry Units, Typical:

Filler	Smooth Blocfil Select SBSL00 Smooth	Level 2 standard fill
Coats	Block Filler, MPI #4	PDCA – Typical
		Level 3 premium fill
		PDCA – where required
		By Code
2 Coats	Evershield Semi-Gloss EVSH50-2, MPI #153	1.5 mils DFT min. per coat

- B. Exterior Hollow Metal Doors and Frames:
- |         |   |                            |
|---------|---|----------------------------|
| 1 Coat  | Bloc-Rust BRPR00-1 Series Primers, MPI #107 | 2 mils DFT min.            |
| 2 Coats | Evershield Semi-Gloss EVSH50-2, MPI #153    | 1.5 mils DFT min. per coat |

C. Ferrous Metals: Refer to Division 09 Section "High-Performance Coatings."

D. Galvanized Metals: Refer to Division 09 Section "High-Performance Coatings."

### 3.9 INTERIOR LOCATIONS

- A. Wood and Wood Fiber Substrates (Low Sheen):
- |         |  |                            |
|---------|--|----------------------------|
| 1 Coat  | Ultragrip Premium UGPR00-1, MPI #39    | 1.5 mils DFT min.          |
| 2 Coats | Evershield Low Sheen EVSH40-1, MPI #43 | 1.5 mils DFT min. per coat |

- B. Gypsum Wallboard (Eggshell):
- |          |                               |                            |
|----------|-------------------------------|----------------------------|
| 1st Coat | Vynylastic Plus Sealer VNPL00 | 2.0 mils DFT min.          |
| 2 Coats  | Spartashield SSSL30, MPI #161 | 1.5 mils DFT min. per coat |

- C. Gypsum Wallboard (Semi-Gloss):
- |          |  |                            |
|----------|--|----------------------------|
| 1st Coat | Vynylastic Plus Sealer VNPL00            | 2.0 mils DFT min.          |
| 2 Coats  | Evershield Semi-Gloss EVSH50-2, MPI #153 | 1.5 mils DFT min. per coat |

D. Gypsum Wallboard, High-Performance Coating (EP): Refer to Division 09 Section "High-Performance Coatings."

- E. Interior Metals:
- |         |   |                            |
|---------|---|----------------------------|
| 1 Coat  | Bloc-Rust BRPR00-1 Series Primers, MPI #107 | 2 mils DFT min.            |
| 2 Coats | Evershield Semi-Gloss EVSH50-2, MPI #153    | 1.5 mils DFT min. per coat |

F. Interior Hand and Guardrails: Refer to Division 09 Section "High-Performance Coatings."

- G. Interior Concrete Masonry Units, Typical:
- |         |  |                            |
|---------|--|----------------------------|
| Filler  | Smooth Blocfil Select SBSL00 Smooth      | Level 2 standard fill      |
| Coats   | Block Filler, MPI #4                     | PDCA – Typical             |
|         |  | Level 3 premium fill       |
|         |  | PDCA – where required      |
|         |  | By Code                    |
| 2 Coats | Evershield Semi-Gloss EVSH50-2, MPI #153 | 1.5 mils DFT min. per coat |

H. Interior Concrete Masonry Units, High Performance Coating (EP): refer to Division 09 Section "High Performance Coatings."

3.10 PAINT COLOR SCHEDULE

- A. General: Refer to Drawings for colors and locations. Colors not indicated in Drawings, i.e., conduit, pipes, etc., shall be painted to match the surface on which they occur.

END OF SECTION

## SECTION 09 9413 - TEXTURED FINISHING

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Gypsum sheathing board and aluminum soffit vent for use under this system at building exterior are specified in Division 09 Section "Gypsum Board Assemblies."

#### 1.2 SUMMARY

- A. This Section includes an integrally colored, 100 percent acrylic polymer-based exterior finish system directly applied to approved substrate.
  - 1. Coating shall be applied over gypsum sheathing at exterior soffits.

#### 1.3 QUALITY ASSURANCE

- A. Acceptable manufacturer shall have marketed textured wall coating systems in the United States for at least five years, and shall have completed at least ten projects utilizing this system. Acceptable manufacturers are as follows:
  - 1. Pleko Southwest.
  - 2. Dryvit Systems, Inc.
  - 3. STO Industries.
  - 4. Senergy, Inc.
  - 5. Parex.
- B. Applicator shall be approved by the manufacturer.

#### 1.4 SUBMITTALS

- A. Submit a sample 2 feet x 2 feet to the Architect in accordance with the General Conditions and General Requirements. Sample shall be mounted on gypsum sheathing board showing proposed finish, texture and color for each condition.
- B. Submit product data including manufacturer's comprehensive product description marked to suit project requirements; include manufacturer's specification and installation recommendations.

#### 1.5 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver products in the original unopened containers, clearly labeled with product identification, batch number and color.
- B. Store fiberglass mesh, cementitious materials and moisture-sensitive materials out of the weather in cool, dry storage.

- C. Store base coat and finish in tightly sealed containers out of direct sunlight protected from temperatures below 40 deg F.

#### 1.6 ENVIRONMENTAL REQUIREMENTS

- A. Application of system shall not take place during inclement weather unless appropriate protection is employed.
- B. Maintain ambient temperature of 40 deg F or higher for 24 hours after installation.

#### 1.7 WARRANTY

- A. Submit warranty in accordance with Division 01 Section "Warranties."
- B. Submit manufacturer's standard, limited 5-year warranty covering replacement of defective materials.

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. Products specified are manufactured by Pleko Southwest to establish the quality, performance and appearance desired for this Project. Similar products by manufacturers listed in Paragraph 1.3 above are also acceptable.

#### 2.2 MATERIALS

- A. Portland Cement: ASTM C150, Type I or Type II.
- B. Reinforcing Fabric: Balanced, open weave, glass fiber fabric made from twisted, multi-end strands treated for compatibility with synthetic coating and base coat material; manufactured or approved by manufacturer of coating system, for use over gypsum sheathing.
  - 1. Standard Mesh: 4.36 ounce +/- 10 percent per square yard weight.

- C. Base Coat Material:

- 1. Pleko Therm Adhesive: 100 percent acrylic polymer dispersion with a quartz or silica aggregate that is field blended with Type I or Type II Portland cement one to one by weight.

OR

- 2. Pleko Dry Adhesive: 100 percent acrylic polymer adhesive/base coat with a quartz or silica aggregate to which 1-1/2 to 2 gallons of potable water are added at point of use per 50 pound bag.

OR

- 3. Pleko Non-Cementitious Adhesive: Ready-mixed 100 percent acrylic polymer dispersion of hardening air-cured materials with a quartz or silica aggregate.

- D. Finish: Pleko finishes are factory mixed, water based, durable; UV, weather, mildew and algae resistant; integrally colored, textured, 100 percent acrylic polymer finishes with time tested resistance to accumulation of dirt.
1. Standard Pleko Finish: 100 percent acrylic polymer dispersion of hardening air-cured materials with a quartz and/or calcium aggregate.
  2. Color: As selected by Architect.
  3. Texture: Pleko "Structure S.F." medium-to-fine sand texture.

## 2.3 MIXES

- A. Pleko Therm Adhesive: Combine fresh Portland cement with Adhesive in a ratio of one to one by weight. Mix in a clean container free of foreign matter. Properly dispose of hardened or partially hardened material.
- B. Pleko Dry Adhesive: Combine 1-1/2 to 2 gallons of potable water with each 50 pound bag of Adhesive. Mix in a clean container free of foreign matter. Properly dispose of hardened or partially hardened material.
- C. Finishes: Factory blend finish material is ready to use direct from the container after stirring. Small quantities, maximum 8 ounces per pail, of potable water may be added to adjust workability.

## 2.4 SOURCE QUALITY CONTROL

- A. General Physical Properties: The finish shall meet or exceed the following performance standards when tested by methods shown:
1. Accelerated Weathering:
    - a. Test: ASTM G 23  
Result: No change after 2000 hours exposure.
    - b. Test: ASTM G 53  
Result: After 3000 hours no effect on texture or integrity.
  2. Wind Driven Rain:  
Test: Fed. Spec. TT-C 555B  
Result: Passes, equivalent to 98 MPH wind for 24 hours.
  3. Bond Strength:  
Test: ASTM C 297  
Result: Concrete 81.0 psi, Gypsum Board 23.6 psi\*.  
\*Failure of substrate
  4. Water Vapor:
    - a. Permeability
    - b. Transmission  
Test: ASTM E96  
Result: Meets UBC requirements.
      - a. 12.34 PERMS
      - b. 4.98 GRAINS/hr./sq.ft.
  5. Mildew Resistance:  
Test: MIL STD 810B  
Result: No growth of mildew.

6. Salt Spray Resistance:  
Test: ASTM B 117  
Result: 624 hours; no change.
7. Freeze Thaw:  
Test: Panels soaked in water at 20 deg C for 4 days, then placed at -10 deg C for 2 hours and 20 deg C for 2 more hours.  
Result: 60 cycles; no cracking, chipping or splitting.
8. Abrasion Resistance:  
Test: ASTM D 968  
Result: 500 liters sand; slight wear. No deleterious effects.
9. Chemical Resistance:  
Test: 3 drops of chemical placed on panel for 24 hours.  
Result: Mineral Spirits: no effect; Muriatic Acid: slight softening and staining.
10. Fire Hazard:  
Test: ASTM E 84  
Comparable methods UL-723, NFPA No. 255, UBC No. 4201  
Result: Flame Spread UBC Class 1, NFPA Class A:5  
Fuel Contribution: 0  
Smoke Developed: 10 (less than red oak)
11. Toxicity:  
Test: Burn-Analyze Emissions  
Result: No greater than Douglas Fir

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Substrate shall be 5/8-inch-thick exterior gypsum sheathing complying with ASTM C 79, as approved by textured coating manufacturer.
- B. Substrate board products shall be installed in accordance with the substrate board manufacturer's recommendations for their product's use in direct-applied finish systems and in accordance with applicable building code(s).
- C. Substrate board edges, at system terminations and penetrations, shall be covered by weather-protecting trim accessories prior to direct applied finish system installation.
- D. Contractor shall ensure that water can not penetrate behind substrate boards at system terminations and penetrations. Use applicable trim accessories, flashing and/or joint sealant and backer rod as required to provide weathertight system edges.
- E. Inspect surfaces to receive finish for planar irregularities, unsupported areas and foreign substances. Applicator shall notify Contractor and Contractor shall notify Architect of any detrimental conditions prior to starting work.

#### 3.2 PREPARATION

- A. Use appropriate means to protect finished work from damage in areas adjacent to textured finish system.

- B. Prepare surfaces in accordance with system manufacturer's instructions.

### 3.3 INSTALLATION OVER GYPSUM SHEATHING

#### A. Base Coat and Mesh Reinforcement:

##### 1. Substrate Board Joint Reinforcement and Base Coat Method:

- a. Cover a 6-inch-wide area over all substrate board joints with 1/16 to 1/8 inch thickness of base coat material. Apply the base coat material with a steel trowel. Fully embed a minimum 4 to 6-inch-wide strip of reinforcing mesh into the wet base coat material, troweling from the center to the edge of the reinforcing fabric to avoid wrinkles. Overlap reinforcing mesh pieces 3 inches minimum.
- b. Spot over all visible substrate board fasteners with base coat material.
- c. Apply by steel trowel approximately 1/16-inch-thick layer of base coat material to entire area receiving the textured finish system. Form a uniform, smooth and level surface for finish application. Smooth and remove defects with a wet brush. Allow sufficient time for drying to a hard surface, but not less than 12 hours, before applying finish.

#### B. Finish:

- 1. Inspect base coat layer to ensure that it is dry and hard before proceeding with finish application. Remove irregularities by sanding. Skim coat with base coat material all areas not completely covered during previous installation and any visible reinforcing mesh. Repeat skim coat application as necessary.
- 2. Apply specified finish directly over base coat to the thickness of the largest aggregate or approximately 1/16 inch with a clean steel trowel. Some finishes may also be applied by use of spray equipment.
- 3. Maintain substrate in a wet stage and finish from corner to corner to joint to avoid cold joints or staging marks.
- 4. Finish shall be applied in accordance with Architect approved sample(s).

### 3.4 CLEANING

- A. Remove all residue and excess items resulting from the work.

END OF SECTION



## SECTION 09 9600 - HIGH-PERFORMANCE COATINGS

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Refer to Section 09 9100 "Painting" for non-high-performance coatings.

#### 1.2 SUMMARY

- A. This Section includes surface preparation and painting of the following:
  - 1. Exposed exterior metals (ferrous and non-ferrous).
  - 2. Exposed interior surfaces where epoxy paint (**EP**) is shown on Room Finish Schedule.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each coating system indicated. Include block fillers and primers.
  - 1. Material List: An inclusive list of required coating materials. Indicate each material and cross-reference the specific coating, finish system, and application. Identify each material by manufacturer's catalog number and general classification.
  - 2. Manufacturer's Information: Manufacturer's technical information, including label analysis and instructions for handling, storing, and applying each material specified.
- B. Certification by manufacturer that products supplied comply with requirements indicated that limit the amount of VOCs in coating products.
- C. Samples for Verification: Of each color and material to be applied, with texture to simulate actual condition, on representative samples of the actual substrate.
  - 1. Submit samples on the following substrates for Architect's review of color and texture:
    - a. Ferrous and Nonferrous Metal: Provide two 4-inch-square samples of flat metal for each color and finish gloss.
    - b. Submit two draw-downs (8-1/2" x 11") of each color and finish gloss.

#### 1.4 CLOSEOUT SUBMITTALS

- A. At completion of Work of this Section, submit the following schedules for inclusion in O&M Manuals.
  - 1. System description for system used on each substrate.
  - 2. Color and finish.

#### 1.5 QUALITY ASSURANCE

- A. Applicator Qualifications: Engage an experienced applicator who has completed high-performance coating system applications similar in material and extent to those indicated for Project and whose work has a record of successful in-service performance.

- B. Source Limitations: Obtain primers and undercoat materials for each coating system from the same manufacturer as the finish coats.

#### 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to Project site in manufacturer's original, unopened packages and containers bearing manufacturer's name and label.
- B. Store materials not in use in tightly covered containers in a well-ventilated area at a minimum ambient temperature of 45 deg F. Maintain containers used in storage in a clean condition, free of foreign materials and residue.
  - 1. Protect materials from freezing. Keep storage area neat and orderly. Remove oily rags and waste daily. Take necessary measures to ensure that workers and work areas are protected from fire and health hazards resulting from handling, mixing, and applying coatings.

#### 1.7 PROJECT CONDITIONS

- A. Apply coatings only when temperature of surfaces to be coated and surrounding air temperatures are between 45 and 95 deg F or manufacturer's recommendations.
- B. Do not apply coatings in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.
  - 1. Allow wet surfaces to dry thoroughly and attain temperature and conditions specified before proceeding with or continuing coating operation.

#### 1.8 EXTRA MATERIALS

- A. Furnish extra high-performance coating materials from the same production run as materials applied and in quantities described below. Package coating materials in unopened, factory-sealed containers for storage and identify with labels describing contents.
  - 1. Quantity: Furnish an additional 1 gallons, as appropriate, of each material and color applied. Contractor shall furnish two copies of the mixing formula to the Architect in addition to the instructions attached to paint containers.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Products: Subject to compliance with requirements, provide products manufactured by one of the following:
  - 1. DuPont.
  - 2. Frazee Industries / Ameron.
  - \* 3. Dunn-Edwards / Carboline.
  - 4. Sherwin Williams.
  - 5. Tnemec.
- B. Typical products specified are manufactured by Dunn-Edwards / Carboline to establish the performance, quality and appearance desired for this project.

## 2.2 COATINGS MATERIALS, GENERAL

- A. Material Compatibility: Provide primers, undercoats, and finish-coat materials 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.
- B. Material Quality: Provide manufacturer's highest grade of the various high-performance coatings specified. Materials not displaying manufacturer's product identification are not acceptable.
- C. VOC Classification: Provide high-performance coating materials, including primers, undercoats, and finish-coat materials, that have a VOC classification of 450 g/L or less.

## 2.3 COLORS

- A. Colors: Refer to Division 09 Section "Painting."

## 2.4 EXTERIOR HIGH-PERFORMANCE COATING SYSTEMS

- A. Ferrous Metal: Provide the following finish systems over exterior ferrous-metal surfaces:

1 coat	Carbomastic 15	Modified Aluminum Epoxy Mastic
2 coats	Carbothane 133 Series	Aliphatic Acrylic Polyurethane
- B. Non-Ferrous and Galvanized Metal: Provide the following finish systems over exterior non-ferrous-metal surfaces:

1 coat	Galoseal WB	Acrylic Primer
2 coats	Carbothane 133 Series	Aliphatic Acrylic Polyurethane
- C. All exterior exposed metals (ferrous and non-ferrous) shall be painted with products specified above in this Paragraph 2.4.

## 2.5 INTERIOR HIGH-PERFORMANCE COATING SYSTEMS

- A. Gypsum Board (EP Finish):

1 coat	Carbocrylic 120	Waterborne Acrylic
2 coats	Carboguard 890 VOC	Cycloaliphatic-Amine Epoxy
- B. Concrete Masonry Units (EP Finish and where indicated was weatherbarrier):

Filler Coat	Concrete Block Filler	Modified Copolymer	Level 3 (PDCA)
	Smooth		
2 Coats	Carboguard 890 VOC	Cycloaliphatic-Amine Epoxy	
- C. Steel Hand and Guardrails:

1 coat	Carbomastic 15	Modified Aluminum Epoxy Mastic
2 coats	Carbothane 133 Series	Aliphatic Acrylic Polyurethane
- D. Where "EP" finish is shown on Room Finish Schedule, provide products specified above in this Paragraph 2.5.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. With Applicator present, examine substrates and conditions under which high-performance coatings will be applied, for compliance with coating application requirements.
  - 1. Apply coatings only after unsatisfactory conditions have been corrected and surfaces to receive coatings are thoroughly dry.
  - 2. Start of application is construed as Applicator's acceptance of surfaces within that particular area.
- B. Coordination of Work: Review other Sections in which primers or other coatings are provided to ensure compatibility of total systems for various substrates. On request, furnish information on characteristics of specified finish materials to ensure compatible primers.

#### 3.2 PREPARATION

- A. General: Remove plates, machined surfaces, and similar items already in place that are not to be coated. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and coating.
  - 1. After completing coating operations, reinstall items that were removed; use workers skilled in the trades involved.
  - 2. See Paragraph 2.6 above for preparation of concrete to receive striping paint.
- B. Cleaning: Before applying high-performance coatings, clean substrates of substances that could impair bond of coatings. Remove oil and grease before cleaning.
  - 1. Schedule cleaning and coating application so dust and other contaminants from cleaning process will not fall on wet, newly coated surfaces.
- C. Surface Preparation: Clean and prepare surfaces to be coated according to manufacturer's written instructions for each substrate condition and as specified.
  - 1. Ferrous-Metal Substrates: Clean ungalvanized ferrous-metal surfaces that have not been shop coated; remove oil, grease, dirt, loose mill scale, and other foreign substances. Use solvent or mechanical cleaning methods that comply with SSPC recommendations.
  - 2. Nonferrous-Metal Substrates: Clean non-ferrous and galvanized surfaces according to manufacturer's written instructions for the type of service, metal substrate, and application required.
- D. Material Preparation: Carefully mix and prepare coating materials according to manufacturer's written instructions.
  - 1. Maintain containers used in mixing and applying coatings in a clean condition, free of foreign materials and residue.
  - 2. Stir materials before applying to produce a mixture of uniform density. Stir as required during application. Do not stir surface film into the material. Remove film and, if necessary, strain coating material before using.
  - 3. Use only the type of thinners approved by manufacturer and only within recommended limits.

- E. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

### 3.3 APPLICATION

- A. General: Apply high-performance coatings according to manufacturer's written instructions.
  1. Use applicators and techniques best suited for the material being applied.
  2. Do not apply high-performance coatings over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions detrimental to forming a durable coating film.
  3. Apply second coat only after the first coat is thoroughly dry.

### 3.4 CLEANING

- A. Cleanup: At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.
  1. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

### 3.5 PROTECTION

- A. Protect work of other trades, whether being coated or not, against damage from coating operation. Correct damage by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.
  1. Provide "Wet Paint" signs to protect newly coated finishes. After completing coating operations, remove temporary protective wrappings provided by others to protect their work.
  2. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces. Comply with procedures specified in PDCA P1.

END OF SECTION



## SECTION 10 1100 - VISUAL DISPLAY SURFACES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Tackboards and markerboards.
- B. Related Sections:
  - 1. Section 09 2116 "Gypsum Board Assemblies."

#### 1.3 ACTION SUBMITTALS

- A. Shop Drawings: Provide for each type of tackboard required. Include sections of typical trim members and dimensioned elevations. Show anchors, grounds, reinforcement, accessories, layout, and installation details.
- B. Product Data: Submit for all products in this Section.
- C. Samples for Verification: For each type of visual display surface indicated, for units with factory-applied color finishes, and as follows:
  - 1. Actual sections of tackboard assembly.
  - 2. Include accessory Samples to verify color selected.

#### 1.4 QUALITY ASSURANCE

- A. Fire Performance Characteristics: Provide fabric-faced tackboards with surface burning characteristics indicated below, as determined by testing assembled materials composed of facings and backings identical to those required in this section, in accordance with ASTM E 84, by a testing organization acceptable to authorities having jurisdiction.
  - 1. Flame Spread: 25 or less.
  - 2. Smoke Developed: 10 or less.
- B. Design Criteria: The drawings indicate size, profiles, and dimensional requirements of visual display boards and are based on the specific type and model indicated. Other visual display boards having equal performance characteristics by other manufacturers may be considered provided that deviations in dimensions and profiles are minor and do not change the design concept or intended performance as judged by the Architect. The burden of proof of equality is on the proposer.

## 1.5 WARRANTY

- A. Porcelain Enamel Chalkboard Warranty: Furnish the manufacturer's written warranty, agreeing to replace porcelain enamel chalkboards that do not retain their original writing and erasing qualities, become slick and shiny, or exhibit crazing, cracking, or flaking, provided the manufacturer's instructions with regard to handling, installation, protection, and maintenance have been followed.
1. Warranty Period: 50 years.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturer: Subject to compliance with requirements, provide products of one of the following:
1. Porcelain Enamel Markerboards and Tackboards:
    - a. Allied Visual Display Boards.
    - b. Claridge Products and Equipment, Inc.
    - c. Lemco.
    - d. NACO/GSI (PolyVision Corporation).
    - e. Newline Products, Inc.
    - f. Venus.
    - g. Platinum Visual Systems.
  2. Products specified below are manufactured by Claridge to establish the quality, performance and appearance desired for this Project. Similar products by other manufacturers listed above are acceptable.

### 2.2 MATERIALS

- A. Porcelain Enamel Markerboard (**MB**): Provide balanced, high-pressure-laminated porcelain enamel markerboards of 3-ply construction consisting of face sheet, core material, and backing.
1. Face Sheet: Claridge 24-gage, porcelain enamel clad, Type 1 stretcher-leveled aluminized steel face sheet. Fuse porcelain enamel coating to steel at approximately 1000 deg F.
    - a. Cover Coat (Markerboards): Provide the manufacturer's standard light-colored special writing surface with gloss finish intended for use with liquid felt-tipped markers.
    - b. Color: Similar to Claridge No. 100 LCS White.
  2. Core: Provide the manufacturer's standard 1/2-inch-thick particleboard core material complying with the requirements of ANSI A208.1, Grade 1-M-1, made with binder containing no urea formaldehyde.
  3. Backing Sheet: Provide the manufacturer's standard .002 aluminum foil sheet backing.
  4. Laminating Adhesive: Provide the manufacturer's standard moisture-resistant thermoplastic-type adhesive.
- B. Vinyl Fabric Faced Tackboard (**TBD**): Vinyl fabric faced tackboard panel on 1/4-inch thick (minimum) cork sheet laminated to hardboard with edges wrapped and satin anodized aluminum trim.
1. Fabric Color: As selected by Architect from manufacturer's full range of standard colors.

- C. Cork Sheet Tackboard (**TBD-1**): Pure grain natural cork, similar to Claridge #1100 "Tan."
  - 1. Thickness of Cork: 1/4-inch.
  - 2. Backing: Make panels rigid by factory laminating cork face sheet under pressure to 1/4-inch-thick hardboard backing.
  - 3. Total Thickness: approximately 1/2-inch.

## 2.3 ACCESSORIES

- A. Metal Trim and Accessories: Claridge trim and accessory numbers are specified to establish the standard required by other listed manufacturers. Fabricate frames and trim of not less than 0.062-inch-thick aluminum alloy, size and shape as indicated, to suit type of installation. Provide straight, single-length units wherever possible; keep joints to a minimum. Miter corners to a neat, hairline closure. Aluminum finish: Satin anodized.
  - 1. Chalk Tray: Claridge No. 271 for each board (full length of board).
  - 2. Tackboards: Furnish manufacturer's channel trim at all edges (typically, No. 804A, 1/2-inch).
  - 3. Trim: Claridge No. 272 and No. 273.
  - 4. Mullion: Claridge No. 186A.

## 2.4 FABRICATION

- A. Assembly: Provide factory-assembled tackboard units, except where field-assembled units are required.
  - 1. Make joints only where total length exceeds maximum manufactured length. Fabricate with the minimum number of joints, balanced around the center of the board, as acceptable to the Architect.
  - 2. Provide manufacturer's standard mullion trim at joints between tackboard units where required.

## 2.5 FINISHES

- A. General: Comply with NAAMM "Metal Finishes Manual" for recommendations relative to application and designations of finishes.
- B. Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.
- C. Class II Clear Anodized Finish: AA-M12C22A31 (Mechanical Finish: as fabricated, nonspecular; Chemical Finish: etched, medium matte, Anodic Coating: Class II Architectural, clear film thicker than 0.4 mil).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Deliver factory-built visual display board units completely assembled in one piece without joints, wherever possible. Where dimensions exceed panel size, provide 2 or more pieces of equal length as acceptable to the Architect. When overall dimensions require delivery in separate units, prefit components at the factory, disassemble for delivery, and make final joints at the site. Use splines at joints to maintain surface alignment.
- B. Install units and accessories in locations and at mounting heights indicated and in accordance with the manufacturer's instructions. Keep perimeter lines straight, plumb, and level. Provide grounds, clips, backing materials, adhesives, brackets, anchors, trim, and accessories necessary for a complete installation.

3.2 ADJUST AND CLEAN

- A. Verify that accessories required for each unit have been properly installed.
- B. Clean units in accordance with manufacturer's instructions.

END OF SECTION

## SECTION 10 1400 - SIGNAGE

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General Conditions and Division 01 Specification Sections, apply to this Section.
- B. Refer to Drawings for letter sizes and sign dimensions.

#### 1.2 SUMMARY

- A. This Section includes the following types of signs:
  - 1. Exterior signs.
  - 2. Interior panel signs.
  - 3. Metal plaques.
  - 4. Cast aluminum letters.
  - 5. Meter (Electrical) Room identification signage.

#### 1.3 ACTION SUBMITTALS

- A. Prior to preparing signage submittal, Contractor to field verify existing signage to ensure new signage to match in material, finish, and anchorage.
- B. Product Data: For each type of sign specified, including details of construction relative to materials, dimensions of individual components, profiles, and finishes.
- C. Shop Drawings: Show fabrication and erection of signs. Include plans, elevations, and large-scale sections of typical members and other components. Show anchors, grounds, layout, reinforcement, accessories, and installation details.
  - 1. Provide message list for each sign required, including large-scale details of wording and lettering layout.
  - 2. For signs supported by or anchored to permanent construction, provide setting drawings, templates, and directions for installation of anchor bolts and other anchors to be installed as a unit of Work in other Sections.
  - 3. Templates: Furnish full-size spacing templates for individually mounted dimensional letters and numbers.
  - 4. Furnish full-size rubbings for metal plaques.
  - 5. Provide full-size details for painted graphics.
  - 6. Submit details for pan channel characters showing construction, mounting method, and interior lighting.
- D. Samples: Provide the following samples of each sign component for verification of compliance with requirements indicated.
  - 1. Samples for verification of color, pattern, and texture:
    - a. Plaques: Full size rubbing.

- b. Aluminum (dimensional characters): Samples of each finish type and color, on 6-inch-long sections of extrusions and not less than 4-inch squares of sheet or plate, showing the specified finish and method of attachment.
- c. Etched Zinc: Manufacturer's color samples consisting of actual sections of material including the specified background colors selected for panel signs.
- d. Acrylic Sheet: 8 by 10 inches for each color required.

#### 1.4 QUALITY ASSURANCE

- A. Sign Fabricator Qualifications: Firm experienced in producing signs similar to those indicated for this Project, with a record of successful in-service performance, and sufficient production capacity to produce sign units required without causing delay in the Work.
  - 1. Signage shall be ADA compliant.
- B. Single-Source Responsibility: For each separate sign type required, obtain signs from one source of a single manufacturer.
- C. Design Concept: The Drawings indicate sizes, profiles, and dimensional requirements of signs and are based on the specific types and models indicated. Sign units by other manufacturers may be considered provided deviations in dimensions and profiles do not change the design concept as judged by the Architect. The burden of proof of equality is on the proposer.

#### 1.5 PROJECT CONDITIONS

- A. Field Measurements: Take field measurements prior to preparation of shop drawings and fabrication to ensure proper fitting. Show recorded measurements on final shop drawings. Coordinate fabrication schedule with construction progress to avoid delay.

#### 1.6 WARRANTY

- A. Special Warranty: Manufacturer agrees to repair or replace components of plaques that fail in materials or workmanship within specified warranty period.
  - 1. Failures include, but are not limited to, the following:
    - a. Deterioration of finishes beyond normal weathering.
    - b. Deterioration of embedded graphic image.
  - 2. Warranty Period: Five years from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Manufacturers of Dimensional Characters:
    - a. A.R.K. Ramos.
    - b. ASI Modulex, Inc.
    - c. Gemini, Inc.
    - d. Matthews International Corp.

- e. Metal Arts.
- f. The Southwell Company.
2. Manufacturers of Cast Plaques:
  - a. Advance Corporation; Braille-Tac Division.
  - b. A.R.K. Ramos.
  - c. Gemini, Inc.
  - d. Matthews International Corp.
  - e. Metal Arts.
  - f. Mills Manufacturing Co.
  - g. The Southwell Company.

- B. Manufacturers of Panel Signs and Pan Channel Characters: Subject to compliance with requirements, provide products by one of the following:
1. ACE Sign Systems, Inc.
  2. Advance Corporation; Braille-Tac Division.
  3. ASI-Modulex, Inc.
  4. Bunting Graphics, Inc.
  5. Gemini Incorporated.
  6. Grimco, Inc.
  7. Innerface Sign Systems, Inc.
  8. Mills Manufacturing Company.
  9. Mohawk Sign Systems.
  10. Mountain States Specialty Co.
  11. Nelson-Harkins Industries.
  12. Signature Signs, Incorporated.

## 2.2 MATERIALS

- A. Zinc: Provide sign material of 99 percent zinc alloy, 0.125 inch thick. Material shall be as recommended by the sign manufacturer for the chemical etching process used and for the use and finish indicated.
- B. Aluminum Castings: Provide aluminum castings of alloy and temper recommended by the sign manufacturer for the casting process used and for the use and finish indicated.
- C. Aluminum Sheet and Plate: ASTM B 209, alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with at least the strength and durability properties of Alloy 5005-H32.
- D. Brass Castings: ASTM B 584, lead-free alloy recommended by manufacturer and finisher for finish matching existing.
- E. Bronze Castings: ASTM B 584, lead-free alloy recommended by manufacturer and finisher for finish matching existing.
- F. Fasteners: Use concealed fasteners fabricated from metals that are not corrosive to the sign material and mounting surface.

- G. Anchors and Inserts: Use nonferrous metal or hot-dipped 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.
- H. Acrylic Sheet: ASTM D 4802, Category A-1 (cell-cast sheet), Type UVA (UV absorbing).

### 2.3 DIMENSIONAL CHARACTERS

- A. Cast Characters: Characters with uniform faces, sharp corners, and precisely formed lines and profiles, and as follows:
  - 1. Character Material: Cast aluminum.
  - 2. Letter Sizes: As indicated on Drawings.
  - 3. Letter Depth: 2 inches typical.
  - 4. Font: Arial Narrow.
  - 5. Finish: Clear anodic, unless otherwise indicated.
  - 6. Text: Refer to Drawings.
  - 7. Mounting Method: Concealed clip mounting, 1/2-inch offset.

### 2.4 PANEL SIGNS

- A. Interior Panel Signs: Provide smooth sign panel surfaces constructed to remain flat under installed conditions within a tolerance of plus or minus 1/16 inch measured diagonally from corner to corner, matching existing signage, and complying with the following requirements:
  - 1. Acrylic Sheet: 0.060 inch thick.
  - 2. Aluminum Plate: 0.125 inch thick.
  - 3. Edge Condition: Square cut.
  - 4. Signs with Changeable Message Capability: Fabricate signs to allow insertion of changeable messages as follows:
    - a. For slide-in changeable inserts, fabricate slot without burrs or constrictions that inhibit function with clear acrylic cover, matching existing.
  - 5. Corner Condition: Rounded to radius indicated.
  - 6. Mounting: Adhered.
  - 7. Color: As selected.
  - 8. Tactile Characters: Characters and Grade 2 Braille raised 1/32 inch above surface with contrasting colors.
- B. Typical exterior signs shall be 0.125 square corner, solid photo-etched zinc. Signage shall have background color, with natural stain zinc highlights. Cast sign shall meet all the requirements of ADA 101-336, Public Law of 1990, sections 4.30 through 4.30-5. Etched zinc signs shall incorporate raised graphics, symbols, and Braille. Sign panel background color shall be custom color to meet the 70 percent contrast requirement of ADA 101-336, Section 4.30-5. Sizes shall be as shown on Drawings. Manufacturer shall submit detail drawings for approval showing layout of signs, mounting method, graphic applications and letter style.
  - 1. Nominal etching depth: 0.032 inch.
  - 2. Fasteners shall be copper studs flash-welded to back of plate for blind stud mounting.
  - 3. Other metal signs include Meter (Electrical) Room signs as follows:
    - a. Meter (Electrical) Room Identification Signage where shown on Drawings:
      - 1) Material: Metal.
      - 2) Color: White letters (one inch high) on red background.

- 3) Verbiage: Electric Equipment Room  
Danger - High Voltage Inside
  - 4) Attachment: Permanently affixed to outside of exterior door with threaded fasteners or rivets (no painting).
- C. Signage for Maximum Occupancy: Signs shall be acrylic (interior use), meeting requirements of paragraph 2.4 above. Size: Refer to Drawings.
- D. Tactile and Braille Sign: Manufacturer's standard process for producing text and symbols complying with ADA-ABA Accessibility Guidelines and with ICC/ANSI A117.1. Text shall be accompanied by Grade 2 Braille. Produce precisely formed characters with square-cut edges free from burrs and cut marks; Braille dots with domed or rounded shape.
1. Panel Material: Opaque acrylic sheet.
  2. Raised-Copy Thickness: Not less than 1/32 inch.

## 2.5 CAST PLAQUE

- A. Cast Plaque (Dedication): Cast-metal plaque with background texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
1. Plaque Material: Cast aluminum, matching existing.
  2. Plaque Thickness: 0.50 inch (match existing).
  3. Graphic: As indicated on Drawings.
  4. Finishes:
    - a. Integral Metal Finish: Match existing.
  5. Integrally Cast Border Style: Square double line, polished (match existing).
  6. Text and Typeface: Accessible raised characters and Braille to match existing.
  7. Plaque Mounting Fasteners:
    - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of plaque, screwed into back of plaque, or screwed into tapped lugs cast integrally into back of plaque unless otherwise indicated.
- B. Cast Plaque (In Courtrooms): Cast-metal plaque with background texture, border, and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:
1. Plaque Material: Cast brass or bronze, matching existing.
  2. Plaque Thickness: 0.50 inch (match existing).
  3. Graphic: Graphix image of County Seal shall be provided by Owner or Owner's representative upon request.
  4. Text and Typeface: Raised characters to match existing.
  5. Finishes:
    - a. Integral Metal Finish: Match existing.
  6. Plaque Mounting Fasteners:
    - a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of plaque, screwed into back of plaque, or screwed into tapped lugs cast integrally into back of plaque unless otherwise indicated.

## 2.6 FINISHES

- A. Colors and Surface Textures: For exposed sign material that requires selection of materials with integral or applied colors, surface textures or other characteristics related to appearance, provide color matches indicated, or if not indicated, as selected by the Architect from the manufacturer's standards.
- B. Metal Finishes: Comply with NAAMM "Metal Finishes Manual" for finish designations and applications recommendations.
- C. Aluminum Finishes: Finish designations prefixed by "AA" conform to the system established by the Aluminum Association for designating aluminum finishes.
  - 1. Clear Anodic Finish: AAMA 611, Class II, 0.010 mm or thicker.
  - 2. Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils. Comply with coating manufacturer's written instructions for cleaning, conversion coating, and applying and baking finish.
- D. Acrylic Sheet Finishes:
  - 1. Colored Coatings for Acrylic Sheet: For copy and background colors, provide colored coatings, including inks, dyes, and paints, that are recommended by acrylic manufacturers for optimum adherence to acrylic surface and that are UV and water resistant for three years for application intended.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. General: Locate sign units and accessories where indicated, using mounting methods of the type described and in compliance with the manufacturer's instructions.
  - 1. Install signs level, plumb, and at the height indicated, with sign surfaces free from distortion or other defects in appearance.
- B. Dimensional Characters: Mount letters and numbers using standard fastening methods recommended by the manufacturer for letter form, type of mounting, wall construction, and condition of exposure indicated. Provide heavy paper template to establish letter spacing and to locate holes for fasteners.
  - 1. Projected Mounting: Unless shown otherwise, mount letters at the projection distance from the wall surface of one inch. Refer to Paragraph 2.3 above.
  - 2. Pin-mount characters flush to substrate where shown.
- C. Wall-Mounted Panel Signs: Attach panel signs to wall surfaces using methods indicated below:
  - 1. Mount signs 60 inches above floor to center and 8 inches from strike side of door frame. Use nonremovable mechanical fasteners placed through predrilled holes. Attach signs with fasteners and anchors suitable for secure attachment to substrate as recommended in writing by sign manufacturer and as shown in reviewed Shop Drawings.

3.2 CLEANING AND PROTECTION

- A. After installation, clean soiled sign surfaces according to the manufacturer's instructions. Protect units from damage until acceptance by the Owner.

END OF SECTION



## SECTION 10 2226 - OPERABLE 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, acoustical panel partitions.
- B. Related Requirements:
  - 1. Section 05 5000 "Metal Fabrications" for supports that attach supporting tracks to overhead structural system.

#### 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.
- C. Samples for Initial Selection: For each type of exposed material, finish, covering, or facing.
  - 1. Include Samples of accessories involving color selection.
  - 2. Panel Edge Material: Not less than 3 inches long.
  - 3. Hardware: One of each exposed door-operating device.

#### 1.6 INFORMATIONAL SUBMITTALS

- A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:
  - 1. Partition track, track supports and bracing, switches, turning space, and storage layout.

2. Suspended ceiling components.
  3. Structural members to which suspension systems are attached.
  4. Items penetrating finished ceiling, including the following:
    - a. Lighting fixtures.
    - b. HVAC ductwork, outlets, and inlets.
    - c. Speakers.
    - d. Sprinklers.
    - e. Smoke detectors.
- B. Setting Drawings: For embedded items and cutouts required in other work, including support-beam, mounting-hole template.
- C. Qualification Data: For qualified Installer.
- D. Product Certificates: For each type of operable panel partition.
  1. Include approval letter signed by manufacturer acknowledging Owner-furnished panel facing material complies with requirements.
- E. Sample Warranty: For manufacturer's special warranty.

#### 1.7 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 7823 "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.

#### 1.8 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 one side of two panels when installed.

#### 1.9 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

#### 1.10 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.

### 1.11 PROJECT CONDITIONS

- A. Field Measurements: Verify actual dimensions of operable panel partition openings by field measurements before fabrication.

### 1.12 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. Partition Warranty: Two years from date of Substantial Completion.
  - 3. Suspension System Warrant: Five years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 PERFORMANCE REQUIREMENTS

- A. Acoustical Performance: Provide operable panel partitions tested by a qualified testing agency for the following acoustical properties according to test methods indicated:
  - 1. Sound-Transmission Requirements: Operable panel partition assembly tested for laboratory sound-transmission loss performance according to ASTM E 90, determined by ASTM E 413, and rated for not less than the STC indicated.
    - a. Sound Transmission Class (STC): 45, minimum.

### 2.2 OPERABLE ACOUSTICAL PANELS

- A. Operable Acoustical Panels: Partition system, including panels, seals, finish facing, suspension system, operators, and accessories.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Advanced Equipment Corporation.
    - b. Hufcor Inc.
    - c. Modernfold, Inc.
  - 2. Basis-of-Design Product: Acousti-Seal 932, Paired-Panel partition as manufactured by Modernfold, Inc.
- B. Panel Operation: Manually operated, paired 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: Standard widths.

- E. Panel Weight: 8 lb/sq. ft. maximum.
- F. Panel Thickness: Not less than 3 inches.
- G. Panel Materials:
  - 1. Steel Frame: Steel sheet, 0.0598-inch nominal minimum thickness for uncoated steel with overlapped and welded corners. Top channel shall be reinforced as required to support suspension system components.
  - 2. Gypsum Face/Liner Sheets: ½-inch tackable gypsum board, Class A rated single material or composite layers continuously bonded to panel frame with minimum STC as indicated in article 2.1 above.
- H. Panel Closure: Manufacturer's standard unless otherwise indicated.
  - 1. Initial Closure: Fixed jamb.
  - 2. Final Closure: Constant-force, crank-operated mechanical closure expanding from panel edge to create a constant-pressure acoustical seal.
- I. Hardware: Manufacturer's standard as required to operate operable panel partition and accessories; with decorative, protective finish.

## 2.3 SEALS

- A. General: Provide seals that produce operable panel partitions complying with performance requirements and the following:
  - 1. Manufacturer's standard seals unless otherwise indicated.
  - 2. Seals made from materials and in profiles that minimize sound leakage.
  - 3. Seals fitting tight at contact surfaces and sealing continuously between adjacent panels and between operable panel partition perimeter and adjacent surfaces, when operable panel partition is extended and closed.
- B. Vertical Seals: Deep-nesting, interlocking steel astragals mounted on each edge of panel, with continuous PVC acoustical seal. Rigid plastic seal are not permitted.
- C. Horizontal Top Seals: Continuous contact extruded vinyl bulb shapes with pairs of non-contacting vinyl fingers to prevent distortion. Mechanically operated top seals are not permitted.
- D. Horizontal Bottom Seals: PVC-faced, mechanical, retractable, constant-force-contact seal exerting uniform constant pressure on floor when extended, ensuring horizontal and vertical sealing and resisting panel movement. Extended seal shall exert nominal 120 pounds downward force to floor throughout operating range.
  - 1. Automatically Operated for Acoustical Panels: Extension and retraction of bottom seal automatically operated by movement of partition, with operating range not less than 2 inches between retracted seal and floor finish.

## 2.4 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.
  - 1. Apply one-piece, seamless facings free of air bubbles, wrinkles, blisters, and other defects, with no gaps or overlaps. Horizontal seams are not permitted. Tightly secure and conceal raw and selvage edges of facing for finished appearance.
  - 2. Where facings with directional or repeating patterns or directional weave are indicated, mark facing top and attach facing in same direction.
- B. Facing Material:
  - 1. Color/Pattern: As indicated on Drawings.
- C. Trimless Edges: Fabricate exposed panel edges so finish facing wraps uninterrupted around panel, covering edge and resulting in an installed partition with facing visible on vertical panel edges, without trim, for minimal sightlines at panel-to-panel joints.

## 2.5 SUSPENSION SYSTEMS

- A. Tracks: Steel with adjustable steel hanger rods for overhead support, designed for operation, size, and weight of operable panel partition indicated. Size track to support partition operation and storage without damage to suspension system, operable panel partitions, or adjacent construction. Limit track deflection to no more than 0.10 inch between bracket supports. Provide a continuous system of track sections and accessories to accommodate configuration and layout indicated for partition operation and storage.
  - 1. Head Closure Trim: As required for acoustical performance; with factory-applied, decorative, protective finish.
  - 2. Track shall be fabricated from single material and designed for fluid, non-binding movement of partition along track. Intermixing of materials shall not be acceptable.
- B. Carriers: Trolley system as required for configuration type, size, and weight of partition and for easy operation; with ball-bearing wheels. Non-steel tires are not acceptable.
- C. Steel Finish: Manufacturer's standard, factory-applied, corrosion-resistant, protective coating unless otherwise indicated.

## 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.

3.3 ADJUSTING

- A. Adjust operable panel partitions, hardware, and other moving parts to function smoothly, and lubricate as recommended by manufacturer.
- B. Adjust storage pocket 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

## SECTION 102600 - WALL AND DOOR PROTECTION

### 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. Corner guards.
- B. Related Requirements:
  - 1. Section 061000 "Rough Carpentry" for in-wall blocking.

#### 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
  - 1. Include construction details, material descriptions, impact strength, dimensions of individual components and profiles, and finishes.
- B. Shop Drawings: For each type of wall and door protection showing locations and extent.
  - 1. Include plans, elevations, sections, and attachment details.
- C. Samples for Initial Selection: For each type of impact-resistant wall-protection unit indicated, in each color and texture specified.
  - 1. Include Samples of accent strips and accessories to verify color selection.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type of exposed plastic material.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For each type of wall and door protection product to include in maintenance manuals.
  - 1. Include recommended methods and frequency of maintenance for maintaining best condition of plastic covers under anticipated traffic and use conditions. Include precautions against using cleaning materials and methods that may be detrimental to finishes and performance.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Store wall and door protection in original undamaged packages and containers inside well-ventilated area protected from weather, moisture, soiling, extreme temperatures, and humidity.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain wall- and door-protection products of each type from single source from single manufacturer.

2.2 PERFORMANCE REQUIREMENTS

- A. Surface Burning Characteristics: Comply with ASTM E 84 or UL 723; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 1. Flame-Spread Index: 25 or less.
  - 2. Smoke-Developed Index: 450 or less.

2.3 CORNER GUARDS

- A. Surface-Mounted, Plastic-Cover Corner Guards: Manufacturer's standard, PVC-free assembly consisting of snap-on, resilient plastic cover installed over retainer; including mounting hardware; fabricated with 90- or 135-degree turn to match wall condition.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Construction Specialties, Inc.; SM-20N or a comparable product by one of the following:
    - a. InPro Corporation (IPC).
    - b. Korogard Wall Protection Systems; a division of RJF International Corporation.
    - c. Nystrom, Inc.
    - d. Pawling Corporation.
  - 2. Cover: Extruded rigid plastic, minimum 0.100-inch wall thickness; as follows:
    - a. Profile: Nominal 3-inch-long leg and 1/4-inch corner radius.
    - b. Height: 7 feet.
    - c. Color and Texture: As selected by Architect from manufacturer's full range.
  - 3. Continuous Retainer: One-piece extruded plastic.
  - 4. Top and Bottom Caps: Prefabricated, injection-molded plastic; color matching cover; field adjustable for close alignment with snap-on cover.

2.4 MATERIALS

- A. Plastic Materials: Chemical- and stain-resistant, high-impact-resistant plastic with integral color throughout; extruded and sheet material as required, thickness as indicated.

- B. Fasteners: Aluminum, nonmagnetic stainless-steel, or other noncorrosive metal screws, bolts, and other fasteners compatible with items being fastened. Use security-type fasteners where exposed to view.
- C. Adhesive: As recommended by protection-product manufacturer and with a VOC content of 70 g/L or less.

## 2.5 FABRICATION

- A. Fabricate wall and door protection according to requirements indicated for design, performance, dimensions, and member sizes, including thicknesses of components.
- B. Quality: Fabricate components with uniformly tight seams and joints and with exposed edges rolled. Provide surfaces free of wrinkles, chips, dents, uneven coloration, and other imperfections. Fabricate members and fittings to produce flush, smooth, and rigid hairline joints.

## 2.6 FINISHES

- A. Protect finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates and wall areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
- B. Examine walls to which wall and door protection will be attached for blocking, grounds, and other solid backing that have been installed in the locations required for secure attachment of support fasteners.
  - 1. For wall and door protection attached with adhesive, verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Complete finishing operations, including painting, before installing wall and door protection.
- B. Before installation, clean substrate to remove dust, debris, and loose particles.

### 3.3 INSTALLATION

- A. Installation Quality: Install wall and door protection according to manufacturer's written instructions, level, plumb, and true to line without distortions. Do not use materials with chips, cracks, voids, stains, or other defects that might be visible in the finished Work.
- B. Install corner guards where indicated on Drawings. If not indicated on Drawings, install at all exterior corner conditions on interior gypsum board walls.
- C. Accessories: Provide splices, mounting hardware, anchors, trim, joint moldings, and other accessories required for a complete installation.
  - 1. Provide anchoring devices and suitable locations to withstand imposed loads.
  - 2. Adjust end caps as required to ensure tight seams.

### 3.4 CLEANING

- A. Immediately after completion of installation, clean plastic covers and accessories using a standard ammonia-based household cleaning agent.
- B. Remove excess adhesive using methods and materials recommended in writing by manufacturer.

END OF SECTION

## SECTION 10 2800 - TOILET AND BATH ACCESSORIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  - 1. Toilet and bath accessories.

#### 1.3 SUBMITTALS

- A. Product Data: Include construction details, material descriptions and thicknesses, dimensions, profiles, fastening and mounting methods, specified options, and finishes for each type of accessory specified.
- B. Setting Drawings: For cutouts required in other work; include templates, substrate preparation instructions, and directions for preparing cutouts and installing anchoring devices.
- C. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required. Use designations indicated in the Toilet and Bath Accessory Schedule and room designations indicated on Drawings in product schedule.
- D. Maintenance Data: For accessories to include in maintenance manuals specified in Division 01. Provide lists of replacement parts and service recommendations.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations: Provide products of same manufacturer for each type of accessory unit and for units exposed to view in same areas, unless otherwise approved by Architect.
- B. Product Options: Accessory requirements, including those for materials, finishes, dimensions, capacities, and performance, are established by specific products indicated in the Toilet and Bath Accessory Schedule.
  - 1. Products of other manufacturers listed in Part 2 with equal characteristics, as judged solely by Architect, may be provided.
  - 2. Do not modify aesthetic effects, as judged solely by Architect, except with Architect's approval. Where modifications are proposed, submit comprehensive explanatory data to Architect for review.

#### 1.5 COORDINATION

- A. Coordinate accessory locations with other work to prevent interference with clearances required for access by disabled persons, 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.

## 1.6 WARRANTY

- A. General Warranty: Special warranty specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Mirror Warranty: Written warranty, executed by mirror manufacturer agreeing to replace mirrors that develop visible silver spoilage defects within minimum warranty period indicated.
  - 1. Minimum Warranty Period: 15 years from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Manufacturers: Products scheduled below are manufactured by Bobrick Washroom Equipment, Inc. and establish the appearance, performance and quality desired for this Project. Subject to compliance with requirements of this Section, equivalent accessories by one of the following manufacturers are also acceptable:
  - 1. Toilet and Bath Accessories:
    - a. A & J Washroom Accessories, Inc.
    - b. American Specialties, Inc.
    - c. Bradley Corporation.
    - d. McKinney/Parker Washroom Accessories Corp.

### 2.2 MATERIALS

- A. Stainless Steel: ASTM A 666, Type 304, with No. 4 finish (satin), in 0.0312-inch minimum nominal thickness, unless otherwise indicated.
- B. Brass: ASTM B 19, leaded and unleaded flat products; ASTM B 16, rods, shapes, forgings, and flat products with finished edges; ASTM B 30, castings.
- C. Sheet Steel: ASTM A 366, cold rolled, commercial quality, 0.0359-inch minimum nominal thickness; surface preparation and metal pretreatment as required for applied finish.
- D. Galvanized Steel Sheet: ASTM A 653, G60.
- E. Baked-Enamel Finish: Factory-applied, gloss-white, baked-acrylic-enamel coating.
- F. Mirror Glass: ASTM C 1036, Type I, Class 1, Quality q2, nominal 6.0 mm thick, with silvering, electroplated copper coating, and protective organic coating complying with FS DD-M-411.
- G. Galvanized Steel Mounting Devices: ASTM A 153, hot-dip galvanized after fabrication.

- H. Fasteners: Screws, bolts, and other devices of same material as accessory unit, tamper and theft resistant when exposed, and of galvanized steel when concealed.

## 2.3 FABRICATION

- A. General: Names or labels are not permitted on exposed faces of accessories. On interior surface not exposed to view or on back surface of each accessory, provide printed, waterproof label or stamped nameplate indicating manufacturer's name and product model number.
- B. 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.
- C. 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.
- D. Framed Glass-Mirror Units: Fabricate frames for glass-mirror units to accommodate glass edge protection material. Provide mirror backing and support system that permits rigid, tamper-resistant glass installation and prevents moisture accumulation.
  - 1. Provide galvanized steel backing sheet, not less than 0.034 inch and full mirror size, with nonabsorptive filler material. Corrugated cardboard is not an acceptable filler material.
- E. Mirror-Unit Hangers: Provide mirror-unit mounting system that permits rigid, tamper- and theft-resistant installation, as follows:
  - 1. One-piece, galvanized steel, wall-hanger device with spring-action locking mechanism to hold mirror unit in position with no exposed screws or bolts.
- F. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of 6 keys to Owner's representative.

## PART 3 - EXECUTION

### 3.1 INSTALLATION

- A. Install accessories according to manufacturers' written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
- B. 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. Install grab bars to withstand a downward load of at least 250 lbf, when tested according to method in ASTM F 446.
- D. Comply with Uniform Federal Accessibility Standards guidelines.

### 3.2 ADJUSTING AND CLEANING

- A. Adjust accessories for unencumbered, smooth operation and verify that mechanisms function properly. 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

- A. Toilet Tissue Dispenser (**TPH**): Where this designation is indicated, provide toilet tissue dispenser complying with the following:
  - 1. Type: Roll-in-reserve dispenser with hinged front secured with tumbler lockset.
  - 2. Mounting: Surface-mounted.
  - 3. Material: Stainless steel.
  - 4. Operation: Noncontrol delivery with manufacturer's standard spindle.
  - 5. Capacity: Designed for 5-1/4-diameter-core tissue rolls.
- B. Grab Bar (**GB-1, GB-2, GB-3**): Where this designation is indicated, provide stainless-steel grab bar complying with the following:
  - 1. Stainless-Steel Nominal Thickness: Minimum 0.05 inch.
  - 2. Mounting: Concealed with manufacturer's standard flanges and anchors.
  - 3. Gripping Surfaces: Smooth, satin finish.
  - 4. Outside Diameter: 1-1/2 inches for heavy-duty applications.
- C. Sanitary Napkin Disposal Unit (**SND**): Where this designation is indicated, provide stainless-steel sanitary napkin disposal unit complying with the following:
  - 1. Recess-Mounted Type: With seamless exposed walls; self-closing top cover; locking bottom panel with stainless-steel, continuous hinge; and removable, reusable receptacle.
- D. Mirror Units (**MR-1**): Where these designations are indicated, provide mirror units complying with the following:
  - 1. Stainless-Steel, Angle-Framed Mirror With Shelf: Fabricate frame from minimum nominal 0.05-inch-thick stainless-steel angles, with square corners mitered, welded, and ground smooth.
  - 2. Shelf: Fabricate from minimum nominal 0.05-inch-thick stainless steel with satin finish. 3/4 inch return edges on front with sloped sides, protruding from face of mirror 3.5 inches.
  - 3. Mirror surfaces shall be as follows:
    - a. Tempered Glass Mirror Surface: No. 1 quality, 1/4-inch-thick, tempered select float glass.
- E. Combination Towel Dispenser / Waste Receptacle (**TD/WR**): Where this designation is indicated, provide stainless-steel semi-recess-mounted combination paper towel dispenser / waste receptacle complying with the following:
  - 1. Semi-Recessed Type: Welded construction, fabricated using 18-8, Type 304, heavy gauge stainless steel with exposed surfaces having satin finish.

2. Paper towel dispenser door shall be drawn, one-piece construction, secured to cabinet body with full-length stainless steel piano-hinge, and equipped with tumbler lock keyed like other washroom accessories.
  3. Waste receptacle shall have hemmed edges for safe handling and secured to cabinet with tumbler lock keyed like other washroom accessories. Capacity: 12 gal.
- F. Toilet Seat Cover Dispenser (**SCD**): Where this designation is indicated, provide toilet seat cover dispenser complying with the following:
1. Surface-Mounted Type: All-welded construction, satin finish 22-gauge Type 304 stainless steel with concealed opening in bottom of unit for filling. Unit shall have rectangular opening, and dispense 250 paper toilet seat covers.
- G. Stainless Steel Shelf (**SSS**): Where this designation is indicated, provide stainless-steel shelf complying with the following:
1. Type 304 stainless steel, 18 gauge, with satin finish. 3/4-inch return edges for maximum rigidity. Front edge hemmed. Mounting brackets, 16 gauge, welded to shelf.

ITEM	DESCRIPTION	BOBRICK #
TPH	TOILET PAPER DISPENSER	B-2888
GB-1	GRAB BAR	B-6806-36
GB-2	GRAB BAR	B-6806-42
GB-3	GRAB BAR (VERTICAL)	B-6806-18
SND	RECESSED NAPKIN DISPOSAL	B-353
MR	MIRROR, FRAMED (size) WITH SHELF	B-166
TD/WR	COMBINATION TOWEL DISPENSER / WASTE RECEPTACLE	B-3961
SCD	TOILET SEAT COVER DISPENSER	B-221
SSS	STAINLESS STEEL SHELF	B-296 x 16

END OF SECTION



## SECTION 10 4400 - FIRE PROTECTION SPECIALTIES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. This Section includes the following:
  1. Fire extinguishers.
  2. Fire extinguisher cabinets.
  3. Fire extinguisher mounting brackets.

#### 1.3 SUBMITTALS

- A. Product Data: For each type of product specified. For fire extinguisher cabinets include rough-in dimensions, details showing mounting methods, relationships of box to surrounding construction, door hardware, cabinet type and materials, door construction, panel style, and materials.

#### 1.4 QUALITY ASSURANCE

- A. UL-Listed Products: Fire extinguishers UL-listed and bear UL "Listing Mark" for type, rating, and classification of extinguisher.
- B. FM-Listed Products: Fire extinguishers approved by Factory Mutual Research Corporation for type, rating, and classification of extinguisher and carry appropriate FM marking.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  1. J.L. Industries.
  2. Larsen's Manufacturing Co.
  3. Potter-Roemer, Inc.

## 2.2 FIRE EXTINGUISHERS

- A. General: Provide fire extinguishers for each extinguisher cabinet and other locations indicated, in colors and finishes selected by Architect from manufacturer's standard, which comply with requirements of governing authorities.
  - 1. Fill and service extinguishers to comply with requirements of governing authorities and manufacturer.
  - 2. Abbreviations indicated below identify extinguisher types related to UL classification and rating system and not necessarily to type and amount of extinguishing material contained in extinguisher.
- B. Multipurpose Dry Chemical Type:
  - 1. Typical: UL-rated 2A-10B:C, 5-lb. nominal capacity, in enameled steel container (Similar to J L Industries Cosmic 5E).
- C. Class K Wet Chemical Type:
  - 1. UL-Rated K, 2-1/2 gallon nominal capacity, in stainless steel cylinder (similar to J L Industries Saturn 25).

## 2.3 FIRE EXTINGUISHER CABINETS

- A. General: Provide fire extinguisher cabinets where indicated, of suitable size for housing fire extinguishers of types and capacities indicated.
- B. Construction: Manufacturer's standard enameled steel box, with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated. Weld all joints and grind smooth. Miter and weld perimeter door frames.
- C. Cabinet Type: Suitable for mounting conditions indicated, of the following types:
  - 1. Semirecessed: Cabinet box (tub) partially recessed in walls of shallow depth.
- D. Trim Style: Fabricate trim in one piece with corners mitered, welded, and ground smooth.
  - 1. Exposed Trim: One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).
    - a. Rolled-Edge Trim with 2-1/2-inch backbend depth.
    - b. Trim Metal: Of same metal and finish as door.
- E. Door Material and Construction: Manufacturer's standard door construction, of material indicated, coordinated with cabinet types and trim styles selected.
  - 1. Stainless Steel: Manufacturer's standard flush, No. 4 stainless steel door construction.
  - 2. Door Glazing: Similar to J.L. Industries #16 Gray Acrylic.
- F. Identification:
  - 1. Identify the extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."
    - a. Location: Applied to cabinet door.
    - b. Application Process: Decals.
    - c. Lettering Color: Black.
    - d. Orientation: Vertical.

- G. Door Style:
  - 1. Similar to J.L. Industries Cosmopolitan Series 8137V16.
- H. Door Hardware: Provide manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated. Provide Saf-T-Lok. Provide concealed or continuous-type hinge permitting door to open 180 degrees.

#### 2.4 MOUNTING BRACKETS

- A. Mounting Brackets: Manufacturer's standard steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
  - 1. Color: Red.
- B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.
  - 1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.
    - a. Orientation: Vertical.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install items included in this Section in locations with top of cabinet at mounting height shown.
  - 1. Prepare recesses in walls for fire extinguisher cabinets as required by type and size of cabinet and style of trim and to comply with manufacturer's instructions.
  - 2. Securely fasten mounting brackets and fire extinguisher cabinets to structure, square and plumb, to comply with manufacturer's instructions.
  - 3. Provide both extinguisher and cabinet where shown on plans.
- B. Install Type K extinguishers on brackets where indicated in Kitchen.

END OF SECTION



SECTION 113000 – AUDIO – VISUAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

- A. General: Comply with all Contract Documents, including conduit/wiring study and project schedule.
- B. These Specialty Systems General provisions apply to the following:
  - 1. Section 113010, Audio Systems.
  - 2. Section 113011, Video Systems.
  - 3. Section 113012, Media Control Systems.
- C. Statement of Work: The work of this section includes, but is not necessarily limited to, the following:
  - 1. As the base bid for this project, the Contractor shall:
    - a) Install, configure, and test a complete and operational Audio and Evidence presentation system at the Pinal County Superior Courts.
  - 2. Any abandoned low voltage cable must be removed from conduits, wall boxes, and floor boxes even if the cabling was abandoned prior to the Contractor commencing work (or if the abandonment was not caused by the Contractor's work). The Contractor shall remove all abandoned low voltage cable from any existing wall or floor box (or section thereof) that will be reused as a part of the cable installation for project. The Contractor shall remove all abandoned low voltage cable from any existing conduit connected to an existing wall or floor box whether or not that conduit will be used as a part of the cable installation for this project.
  - 3. Unless noted otherwise on the Drawings, the work shall include everything necessary or incidental to complete the installation including, but not limited to, receptacle plates, wire, electrical boxes, racks, accessories, parts, etc. The Contractor shall furnish all necessary information to ensure that a proper audiovisual system will be installed.
  - 4. This project involves replacing and/or adding equipment to an existing equipment rack that is in service. Remove all cabling from the equipment rack that becomes abandoned as a result of this scope of work or that is abandoned prior to the start of this scope of work.
  - 5. The Contractor shall restore finish hardware to original condition including painting, wall, millwork, and ceiling modifications and attachments.
  - 6. The Contractor shall provide comprehensive training of system operation.
- D. The contractor shall provide all submittals, equipment, work, and warranty service as outlined in the Blanket Purchase Agreement (BPA) for Courtroom Technology audiovisual systems (services and equipment) and as described herein.

1.2 SCOPE OF WORK

- A. The contractor shall furnish all equipment and materials, including but not limited to wiring, cables, connectors, all hardware and mounting brackets, carts, stands, batteries, lamps, operating systems software, application software, screens and control panels, whether specifically mentioned herein or not, to ensure a complete and operating system consistent with the design intent.
- B. The Contractor shall provide equipment that, where required, shall conform to the applicable requirements of the Underwriter's Laboratories, Inc., local codes, the National Electrical Code and any other governing codes. Such items shall bear a label or mark indicating their conformance to the above requirements.
- C. The Contractor shall provide systems configured and installed for simplicity of operation and low maintenance, with user-friendly controls.
- D. The Contractor shall provide audio, visual evidence, video conferencing and integrated control systems compatible with the Owner's operations. The burden shall be on the Contractor to coordinate system functionality with the Owner / Architect / Engineer. Specifically, control panels and functions shall be reviewed and approved by the Owner / Architect / Engineer.
- E. The Contractor shall perform a "conduit/wiring analysis" of the site before commencing field installation. This is to determine that all the electrical provisions (identified as being provided by others) have been installed as indicated on the Drawings. Any discrepancies or deficiencies noted during the inspection shall be documented in writing and be sent to the Owner / Architect / Engineer within five (5) business days of the inspection.
- F. The Contractor shall provide a Program Manager to facilitate Owner-Contractor interfacing and mutual understanding. The Program Manager shall be responsible for formulating and enforcing work standards, assigning schedules, reviewing work discrepancies, and communicating policies, purposes, and goals of the organization to subordinates.
- G. The Contractor shall provide an On-Site Installation Team Leader. The On-Site Installation Team Leader shall be the Contractor's authorized point of contact and shall be responsible for coordinating the day-to-day administration with the Court representatives, the Architect and the Engineer. The On-Site Installation Team Leader shall be responsible for monitoring ongoing installation to ensure adherence to the schedule and cost.
- H. The Contractor's On-Site Installation Team Leader shall be present on site during the substantial completion site visit. This individual shall be technically capable of making any change to any portion of the control code or touch panel page layout and upload the modified code or page(s) to the control system processor(s) or touch panel(s).
- I. The Contractor shall generate all shop drawings and information for the complete installation and wiring of the system, see Section 1.3 Submittals. The Contractor shall provide (or sub- contract for) the on-site installation and wiring, and shall provide ongoing supervision and coordination during the installation phase.
- J. The Contractor shall remove any existing audiovisual equipment and wiring that will not be reused. The Contractor shall dispose of the equipment in a manner acceptable to the

Owner / Architect / Engineer.

- K. The Contractor shall be responsible for the initial adjustment and configuration of all systems, including but not limited to audio systems DSP processing, control systems, video scalars, windowing processors, and displays, and AV network components, such as streaming audio, and recording devices as described herein and on the drawings. All teleconferencing equipment (including endpoints and head-end systems) shall be provided with manufacturer on-site installation (physical installation) and implementation (project management and configuration) services. The contractor shall provide all test equipment for the system substantial completion acceptance testing and shall provide all test results in writing to the Owner / Architect / Engineer at the time of final acceptance testing. All test equipment shall be available and on site at the time of the courts and designer's substantial completion testing and may be required on site at the Owner's discretion at the final inspection checkout.
- L. The Contractor shall provide a two (2)-year warranty. The Contractor shall provide a Statement of Warranty on the entire system and on the individual pieces of equipment. This warranty shall obligate the Contractor to provide the Owner all equipment, material, and labor, at no charge to the Owner, during the warranty period, in the event of system or equipment malfunction or failure. The warranty shall commence on the date of the system acceptance. Acceptance shall be defined as the point at which all punch list items found during the initial installation period have been corrected.

### 1.3 SUBMITTALS

- A. Provide the Work of this Section in accordance with the Contract Documents. While some submittals may require subsequent re-submittals, there will be four (4) major submittal packages provided by the Contractor to the Owner / Architect / Engineer in the scope of this project. Failure to include all items, will constitute an incomplete submittal. Partial submittals may be allowed as defined below. Incomplete submittals may, at the Engineer's discretion, be returned un-reviewed. The submittals required are as follows:
- B. Prior to the award of contract, certain submittals shall be provided as part of the bid package. These include the following:
  - 1. The Audio-Visual System Documentation.
  - 2. Restatement of the "Scope of Work" incorporating these criteria by reference.
  - 3. A signed Statement of Compliance.
  - 4. A detailed schedule showing, for each piece of equipment, the offered make, model, quantity and proposed unit and total prices in spreadsheet format.
  - 5. Manufacturer's specification sheets for each proposed equipment substitution.
  - 6. Single line drawings for proposed alternate designs.
- C. Prior to ordering equipment, pre-installation submittals shall be provided and shall include but not be limited to the following. Equipment ordering may not commence until approved submittals are received by the Contractor. Partial submittals may be acceptable to accommodate a compressed installation schedule. If partial submittals are required, the Contractor shall notify the Owner / Architect / Engineer that partial submittals will be sent. When partial submittals are used, equipment ordering may only commence on the approved portions of the submittal package.
  - 1. The Audio-Visual System Documentation.

2. The Audio-Visual Cabling Pull Schedule.
  3. Complete system construction and point to point wiring schematic drawings, including all component values and showing complete letter and number identification of all wire and cable as well as jacks, terminals and connectors.
  4. Documentation identifying the specific configuration requirements of networks (including TCP/IP and telecommunications) to be provided by the Court. This document shall include required TCP/IP address for all AV and control equipment, configuration and provisioning requirements for interconnects.
  5. Floor plans and reflected ceiling plans showing device layout throughout all space(s) included in the contract. Contact the Owner / Architect / Engineer for electronic backgrounds.
  6. Screen captures of all control panel layouts.
  7. Dimensioned shop drawings of all custom designed consoles, tables, carts, support bases, and shelves. Provide finish sample for all.
  8. Schematic drawings of all custom components, assemblies and circuitry.
  9. Shop drawings of all unusual equipment modifications.
  10. Run sheets or field wiring details.
  11. Patch panel assignment layout drawings.
  12. Front elevation drawings of each equipment rack configuration.
  13. The Contractor shall not procure any equipment included in this scope of work prior to receiving shop drawings returned as approved by the Architect / Engineer or other written approval from the Owner / Architect / Engineer.
- D. After installation, but prior to acceptance testing, submittals shall be provided a minimum of two (2) weeks prior to any scheduled acceptance testing by the Owner and the Owner's Representatives and shall include the following:
1. The Audio-Visual System Documentation.
  2. The Documentation Worksheets.
  3. A list of test equipment, giving make and model numbers to be used for all tests and acceptance testing, in spreadsheet format.
  4. A draft version of "As-built" drawings for every item depicting the current state of the systems to be tested.
  5. A draft version of the simplified one (1) page instructions to be provided with final documentation.
  6. A list of all fixed or static IP addresses.
  7. A draft of the reduced block diagrams to be posted at the side of each equipment cabinet, along with critical telephone numbers.
  8. One (1) copy of all control software programming including control screens and all uncompiled source code. The source codes for the integration of all installation under the project shall be delivered to the Owner with unlimited but not exclusive rights at the completion of the installation. The contractor shall provide a labeled CD-ROM inserted into a plastic computer media sleeve containing software setup and configuration files for all configurable equipment, including control system processors, custom source codes, compiled programs, software controlled screens, computer workstation controllers, software-configured signal switchers, mixers, DSP units, or other signal processors. The contractor shall provide all installation programs and drivers necessary to transfer the software settings or programs to each respective piece of equipment. In addition, the contractor shall provide complete documentation of the software in the Technical Manual.

9. A draft version of the Technical and User Manuals. Each manual shall contain printed operation instructions for all system functions whose format has been compiled specifically for each system. Providing standard factory equipment operating instructions alone is not acceptable.
  - a) The "Technical Reference Manuals" shall include:
    - 1) Final rack elevation drawings.
    - 2) Detailed functional block diagrams which illustrate as-built conditions identifying each equipment item by manufacturer and model number, labeling alpha-numerically all contractor furnished controls, relays, patch panel jacks, and other similar devices and referencing these designations on fabrication drawings, patch panel details and other related instruments.
    - 3) Detailed as-built drawings of all contractor fabrications illustrating the mechanical and electrical construction with manufacturer's part numbers and values for all components. Also included shall be floor and reflected ceiling plans indicating device layouts and locations throughout the spaces included in the contract.
    - 4) Manufacturer's literature, to include descriptive literature and performance specifications, operating manuals, and servicing information.
    - 5) Schedule of nominal control settings for proper system operation.
    - 6) Test and measurement data gathered
    - 7) A restatement of the terms and conditions of the warranty system and warranty service including any extended Original Equipment Manufacturer (OEM) warranties beyond the standard one year warranty required herein.
    - 8) Inventory Listing Reports.
    - 9) Complete documentation of installed software.
  - b) The "User Manuals" shall include:
    - 1) Systems operating instructions for each system specifically describing the functions, operation, and maintenance of the system installed. The instructions shall be written in full detail for comprehension by non-technical persons.
    - 2) Schedule of nominal control settings for proper system operation.
    - 3) Troubleshooting guide for system operators, listing the procedures to follow in the event of an apparent equipment failure, written in logical outline form.
    - 4) Simplified as-built block diagrams deleting alpha-numeric references to controls, relays, patch panel jacks and other similar devices
    - 5) A restatement of the terms and conditions of the warranty system and warranty service including any extended Original Equipment Manufacturer (OEM) warranties beyond the standard one year warranty required herein.
- E. While not a submittal, at the time of acceptance testing, the Contractor shall be responsible for providing the following on site:
  1. All test equipment approved in the submittal process specified herein.
  2. A representative of the Contractor, capable of answering basic questions about the installation, will be on-site during acceptance testing.
  3. A complete package of the approved submittal specified herein.
  4. Appropriate media for all source equipment, including but not limited to, DVDs,

- audio cassette tapes, video test pattern generator, audio tone generator, etc.
5. The Contractor's lead system programmer responsible for this scope shall be present (in person, at the job site) to facilitate needed changes identified during testing.
- F. Within thirty (30) days after acceptance testing, and/or prior to final system acceptance submittals (whichever is earlier) shall be provided and shall include the following:
1. The Audio-Visual System Documentation.
  2. Equipment manufacturer's operation and maintenance manuals for each piece of equipment.
  3. Corrected "As-built" drawings for every item depicting the state of the system at the time of system acceptance.
  4. Four (4) copies of the final version of the Technical and User Manuals.
  5. A list of all fixed or static IP addresses.
  6. A reduced block diagrams, along with critical telephone numbers, shall be mounted near the audio-visual equipment rack in a frame with plastic or glass covering.
  7. Two (2) copies of all control software programming including control screens and all source code. Provide documentation in written form of all source code and screen captures of all control screens. Provide electronic copies of all source code on CD-ROM.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Control handling and installation of hardware and equipment items that are not immediately replaceable, so that completion of the work will not be delayed by hardware or equipment losses, both before and after installation.
- B. Prior to installation, protect exposed surfaces with material that is easily removed without marring finishes.
- C. The Owner will not provide additional space to the contractor for the purpose of pre-assembly and testing. Any required pre-assembly and testing must be conducted at the Contractor's facility.

#### 1.5 SPACE CONDITIONS:

- A. Verify dimensions of equipment, equipment arrangements, space availability (including any millwork or cabinetry provided by others) and provide systems that work within the constraints of the space available. Notify the Owner / Architect / Engineer of any situation where space constraints are a problem, prior to the ordering or purchase of equipment. The Contractor shall bear the expense of providing alternate equipment which will work within the available space, if space availability problems are discovered after equipment is ordered.
- B. Drawings indicate locations of equipment and components. Changes in the location, and offsets, of same to accommodate building conditions, and coordination with the work of other trades shall be made prior to initial installation, without additional cost to the Owner.
- C. Provide access to equipment and components requiring operation, service or maintenance within the life of the system.

- D. Prior to Acceptance Testing all debris and boxes must be removed from the site, and all equipment rooms and control rooms shall be neat and orderly.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Quantities: Unless otherwise noted, quantities shall be as indicated on the drawings.
- B. All equipment and material shall be new.
- C. Performance criteria or physical characteristics specified herein represent minimum acceptable values unless noted otherwise.
- D. All items of equipment whether a stock manufactured item or custom built shall be supported by complete and detailed schematic drawings and replacement parts lists. No "black boxes" or unidentified components shall be acceptable.
- E. Finish of all visible equipment shall be matte black, flat gray, or a similar non-reflective color unless otherwise specified herein or on the Drawings.
- F. Where equipment is specified by a brand name or manufacturer's make and model number it is intended to be descriptive, but not restrictive, and to indicate the quality and performance characteristics of the article described.
- G. When a newer model has superseded a manufacturer's product, the later model shall be furnished, provided the new model retains or exceeds all of the characteristics of the superseded item specified herein.

### 2.2 EQUIPMENT ENCLOSURES

- A. Floor-Mounted Equipment Cabinets:
  - 1. Minimum 16 gauge (1.6 mm) steel construction.
  - 2. Enclosed with ventilated side panels, square front and vertical corners.
  - 3. Front door and bottom shall be omitted for proper ventilation and cabling.
  - 4. Key lockable rear door with racks keyed alike, match keys to existing AV cabinets.
  - 5. Minimum 23" (600 mm) deep.
  - 6. Configured for standard 19" (480 mm) rack panels.
  - 7. Minimum 40 RU internal capacity.
  - 8. Maximum 84" (2134 mm) total height.
  - 9. Finish color shall be selected by the Owner.
  - 10. Manufacturer: Atlas Sound, Middle Atlantic Products, or Winsted.
- B. Millwork Equipment Racks:
  - 1. Functionally designed for installation in millwork.
  - 2. Minimum 16 gauge (1.6 mm) steel construction.
  - 3. Racks shall be sized to equipment as depicted in the drawings and the millwork space provided.
  - 4. Able to slide out and rotate from the millwork allowing for easy access to the rear of

- the installed equipment.
5. Finish color shall be selected by the Owner.
  6. Manufacturer: Atlas Sound, Middle Atlantic Products, or Winsted.
- C. General:
1. AC power for equipment provided under these Sections shall be controlled by a low voltage relay type sequential switching systems via a master switches mounted in a standard 480 mm rack. Operational characteristics shall be push on/push off. An LED or lamp status devices shall provide indication that the systems is are on.
- D. Power Strips:
1. 125V, 20 ampere capacity.
  2. Minimum of 4 spare duplex outlets.
  3. Outlets shall have integral transient suppression in accordance with UL 1449-1996 and ANSI/IEEE C62.41-1991 (R1995).
  4. RF noise attenuation shall exceed 40 dB in both transverse and common modes from 1 to 100 MHz.
  5. UL listed.
  6. Manufacturer: Furman, Middle Atlantic, or SurgeX.
- E. Transient Surge Suppressors with Remote Turn-On:
1. 125V, 20 ampere capacity.
  2. Minimum of 4 spare duplex outlets.
  3. Outlets shall have integral transient suppression in accordance with UL 1449-1996 and ANSI/IEEE C62.41-1991 (R1995).
  4. RF noise attenuation shall exceed 40 dB in both transverse and common modes from 1 to 100 MHz.
  5. UL listed.
  6. Meet or exceed 1996 Federal Grade A, Class 1, Mode 1 Guidelines for power line surge suppressors.
  7. Unit shall employ three limiter circuits: a series surge reactor current limiter, a cascaded auto-tracking dual-polarity voltage limiter, and dual pulse inverters.
  8. Units shall have remote control capability to switch on the six (6) switched outlets via applied DC voltage or contact closure.
  9. Basis of design: Middle Atlantic RackLink series SurgeX SX series.

## PART 3 - EXECUTION

### 3.1 GENERAL

- A. Installation shall include the delivery, unloading, setting in place, fastening to walls, floors, ceilings, counters, or other structures where required, interconnecting wiring of the system components, equipment alignment and adjustment, and all other work whether or not expressly required herein which is necessary to result in complete operational systems.
- B. The installation of all work must be in accordance with commonly accepted industry standards and practice. A qualified Engineer shall exercise Engineering supervision over

the entire installation and inspect the installation at least twice prior to Acceptance Testing. It is the responsibility of the Contractor to cooperate with other trades in order to achieve well-coordinated progress and satisfactory final results. The Contractor must watch for conflicts with work of other contractors on the job and execute moderate moves or changes as are necessary to accommodate other equipment or preserve symmetry and pleasing appearance.

- C. Wire all systems in accordance with Standard Broadcast Practices and the National Electrical Code, NFPA, SMPTE, NAB, UL, EIA, FCC, NTSC, Design and Installation (SAMS) and any other authority having jurisdiction. Where a conflict occurs, follow the most stringent requirements. Refer to schematic and block diagrams.
- D. If, in the opinion of the Contractor, an installation practice is desired or required, which is contrary to these specifications or drawings, a written request for modification shall be made to the Engineer. Modifications shall not commence without written approval from the Engineer
- E. Provide necessary screws, anchors, clamps, tie wraps, distribution rings, miscellaneous grounding and support hardware necessary to facilitate the installation of the system.
- F. Furnish special installation equipment or tools necessary to properly complete the system, including but not limited to, tools for terminating, testing and splicing cables.
- G. All installation practices shall be in accordance with, but not limited to, these specifications and drawings.

### 3.2 PHYSICAL INSTALLATION

- A. Provide incidental equipment or devices to provide a complete and operable system.
- B. Verify correctness of parts lists and equipment model numbers and conformance of each component with manufacturer's specifications.
- C. Equipment shall be installed in accordance with the manufacturer's instructions.
- D. All equipment, except portable equipment, shall be held in place. This shall include equipment, enclosures, components, and cables. Fastenings and supports shall support their loads with a safety factor of at least 3 unless otherwise specified herein. Equipment cabinets shall be square and plumb.
- E. Prevent and guard against electro-magnetic and electro-static hum, and install the equipment to provide safety for the operator.
- F. Repair or replace any equipment or materials damaged during the construction period.
- G. Provide firestopping for all new penetrations made in support of the installation. Repair or replace any firestopping that is damaged or removed during installation. Firestopping shall adhere to all applicable codes and building standards that may be in force.

- H. Provide power connections from existing panels to specialty equipment in accordance with NFPA 70-2002, and as indicated on the Drawings.
- I. All boxes, equipment, etc., shall be secured plumb and square.
- J. All equipment items, including cables, shall have externally visible labels that indicate the equipment's serial number or cable connection points. See the drawings for additional labeling requirements.

### 3.3 CABLE INSTALLATION

- A. Install plenum rated cables where cables are not installed in conduits or enclosed wireways.
- B. All cables, regardless of length, shall be labeled using the following criteria:
  - 1. Provide self-laminating computer printed cable marker for all cable designations.
  - 2. No cables shall be marked with handwritten markers or tags which protrude from the cable.
  - 3. Label both ends of every cable to exactly correspond with the shop drawings and run sheets approved during the submittal process.
  - 4. Labels shall use text with a minimum height of .2" (5 mm).
- C. Provide cable pass through holes as required. Provide grommets in all pass through holes. Coordinate placement of holes with Owner / Architect / Engineer. Indicate placement on Shop Drawings. Review all locations with the Owner / Architect / Engineer before drilling.
- D. It is the intent for all audio, audiovisual, and control cables to be concealed. To this end, the Contractor shall provide materials and labor to drill holes through hard walls and provide surface mounted raceways inside and outside the courtroom. In the event that it is demonstrated to be impossible to drill the required holes, the Contractor shall provide wood n moldings (stained to match the courtroom finish) configured to best blend in with the existing wooden panels and/or furniture.
- E. Contractor shall ensure that all audio, audiovisual, and control cables are neatly dressed with split loom tubing or equivalent for pleasing appearance and safety.
- F. All inter-rack cabling shall be neatly strapped, dressed, and adequately supported.
- G. Terminal blocks, boards, strips, or connectors, shall be furnished for all cables which interface with racks, cabinets, consoles, or equipment modules. No audio cables shall run directly to the audio patch panel jacks. Each audio patch panel shall be furnished with an audio terminal block, and all audio cables to and from the audio patch panel shall terminate on this block.
- H. Provide quick disconnect connectors within the rack for equipment that is not provided with manufacturer installed connections. The connectors shall be of industry standard type, appropriate to the signal and voltages required by the equipment. Internal rack wiring shall not be wired directly to the equipment via screw or solder connections.
- I. All cables shall be grouped according to the signals being carried. In order to reduce

signal contamination, separate groups shall be formed for the following cables:

1. Power cables,
2. Analog control cables,
3. Digital control cables,
4. Audio cables carrying signals less than -20 dBm,
5. Audio cables carrying signals between -20 dBm and +20 dBm,
6. Audio cables carrying signals above +20 dBm,
7. Digital video cables,
8. RGB-HV cables,
9. S-Video cables,
10. Video cables, and
11. Radio frequency (RF) cables.

NOTE - Under no circumstances should audio cables be allowed to run in the same raceway as video, computer or power cables.

- J. Racks shall have power on one side and low voltage on the other side. As a general practice, all power cables, control cables, and high level cables shall be run on the left side of an equipment rack as viewed from the rear. All other cables shall be run on the right side of an equipment rack, as viewed from the rear.
- K. Cables shall be routed at least 24" (610 mm) from any fluorescent ballast and at least 1 m from any electric motors or other high level source of electromagnetic interference.
- L. All cables shall be cut to the length dictated by the run. No splices shall be permitted in any pull boxes without prior permission of the Engineer. For equipment mounted in drawers or on slides, the interconnecting cables shall be provided with a service loop of appropriate length.
- M. All cables in conduits must be insulated and shielded from each other and from the conduit the entire length and must not be spliced. Ground all the shields at the high-level termination end of the respective circuits only, unless otherwise specified herein. Heat shrink tubing shall be used to dress the ends of all wire and cabling including a separate tube for the drain or ground wire.
- N. Ensure that the maximum pulling tensions of the specified distribution cables are not exceeded and cable bends maintain the proper radius during the placement of the facilities. No cable shall be installed with a bend radius less than that recommended by the cable manufacturer. Observe the bending radius and pulling strength requirements of the cables during handling and installation. Provide clutch or shear pin protection for cables during cable pulling to ensure cable pulling tension is not exceeded.
- O. Provide temporary protection of cables before termination. Cables shall not be left lying on the floor. Bundle and tie wrap to provide protection.

### 3.4 CONNECTOR ASSEMBLIES

- A. Provide engraved wall connector assembly plates for all audio, audiovisual, and control

connections. The finish of all visible connector assemblies shall be coordinate with, and approved by, the Owner / Architect / Engineer Thickness as required. Hidden (not easily seen) connector assemblies may be stainless steel or anodized aluminum, unless otherwise noted.

- B. Coordinate the placement of all audio and audiovisual devices and connector assemblies with the Owner / Architect / Engineer. Indicate placement on Shop Drawings. Review all locations with the Owner / Architect / Engineer prior to installation.

### 3.5 GROUNDING PROCEDURES

- A. The Contractor shall ensure that all power circuits are on the same electrical phase and that all ground cables are only connected to one point at the power breaker panel.
- B. In order to minimize problems resulting from improper grounding and to achieve maximum signal-to-noise ratios, the following grounding procedures shall be adhered to:
  - 1. System Grounds: A single primary "system ground" shall be established for the systems in each particular area. All grounding conductors in that area shall connect to this primary system ground. The system ground shall be provided in the audio equipment rack for the area, and shall consist of a copper bar of sufficient size to accommodate all secondary ground conductors.
  - 2. A copper conductor, installed in a raceway by this contractor, having a maximum of 0.1 Ohms total resistance, shall connect the primary system ground bar to the nearest metallic electrical conduit of at least 2" (54 mm) in diameter. The Contractor shall be responsible for determining if the metallic conduit is properly electrically bonded to the building ground system.
  - 3. Secondary system grounding conductors shall be provided from all racks, audio consoles, and ungrounded audio equipment in each area to the primary system grounding point for the area. Each of these grounding conductors shall have a maximum of 0.1 Ohms total resistance.
  - 4. Under no conditions shall the AC neutral conductor, either in the power panel or in a receptacle outlet, be used for a system ground.
  - 5. Audio Cable Shields: All audio cable shields shall be grounded at one point only. There are no exceptions. For inter and intra-rack wiring this requires that the shield be connected at one end only. For ungrounded portable equipment, such as microphones, the shield shall be connected at both ends but grounded at only one end.
  - 6. General: Because of the great number of possible variations in grounding systems, it shall be the responsibility of the Contractor to follow good engineering practice, as outlined above, and to deviate from these practices only when necessary to minimize crosstalk and to maximize signal-to-noise ratios in the audio, video, and control systems. The Contractor shall submit a written request to the Owner / Architect / Engineer, with justification and technical support materials, for approval of alternate grounding methods and practices.

### 3.6 POWER DISTRIBUTION IN EQUIPMENT RACKS

- A. General: Provide Surge Suppressors with Remote Turn-On at the top of each rack and

wire into control system. Provide Power Conditioners which shall plug into the Surge Suppressors and distribute power to groups of equipment. All rack mounted equipment will have conditioned power.

- B. When an uninterruptable power supply (UPS) is specified, only products with volatile memory (including but not limited to control system components automatic mixers) shall be connected to the UPS. Do not connect power amplifiers to the UPS.

### 3.7 SPARE PARTS

- A. Provide replacement fuses, lamps, batteries and connectors in sufficient quantities to last one (1) year.

### 3.8 QUALITY CONTROL

- A. Provide and maintain an effective Quality Control program and perform sufficient inspections, surveys and tests of all items of work, including those of other trades, to ensure compliance with the contract documents. Furnish appropriate facilities, accurately calibrated instruments and testing devices required to perform the quality control operations and with sufficient work forces to cover the construction operations within the actual construction sequences. Coordinate this work with the quality control requirements of other technical Sections of the Specifications and with requirements of the Contractor and governing authorities having jurisdiction.

### 3.9 PROPOSED SUBSTITUTIONS

- A. Where specific equipment is described it is not the intention to discriminate against the products of other manufacturers, but rather to establish a standard of quality. The use of trade names on the drawings or finish schedule is to establish the file pattern to be used. It is not intended to exclude other manufacturers whose patterns, in the judgment of the Owner / Architect / Engineer, are equivalent to those named. All proposed substitutions shall be submitted as alternates with complete data.
- B. The Owner / Architect / Engineer requires manufacturers' original specification tests. The Owner / Architect / Engineer will evaluate and approve the substitutions.

END OF SECTION



## SECTION 113010 – AUDIO SYSTEM

### PART 1 - GENERAL

#### 1.1 SUMMARY

- A. Specialty systems general provisions are specified in Section 113000, Specialty Systems General.
- B. This Section covers audio systems.

#### 1.2 AUDIO SYSTEM DESCRIPTION

- A. Sound Reinforcement
  - 1. All Hearing Rooms
    - a) Microphone assemblies, stands, cables, and wall/floor/ceiling connector assemblies at locations designated on the Drawings.
    - b) Automatic microphone mixing, signal processing and amplification equipment in designated equipment racks.
    - c) Ceiling loudspeaker assemblies arrayed for uniform coverage and zoned with volume control throughout the listening area with consideration taken to account for room architecture and acoustics. Wall mounted loudspeakers where ceiling loudspeakers cannot be installed.
    - d) XPanel application installed on Judges' and Clerks' workstations to control features of the audio system including but not limited to:
      - 1) Volume control and mute check box for every microphone and every line level input with level indicator on a separate microphone volume setup page. Provide three user presets in addition to the default settings that can be set and recalled from this setup page.
      - 2) Remote audio mute to suppress all audio leaving the courtroom.
      - 3) Volume control of noise masking sources.
  - B. Audio Playback / Recorded Evidence
    - 1. All Hearing Rooms
      - a) Audio playback from Liberty Player via auxiliary input jack(s) at the specified Judge's / Clerk's workstation.
      - b) Recorded audio played through sound reinforcement loudspeakers.
  - C. Electronic Audio Recording
    - 1. All Hearing Rooms
      - a) Eight (8) channels of audio for recording at the Clerks' workstations. Provide additional audio channels to the Audio Server I/O via expansion card, card to be Biamp Server I/O Dante expansion card or approved equal.
      - b) Provide and install soundcard in Clerks' workstations (workstation provided by owner), unit to be Dante PCIe-R Soundcard or approved equal.
      - c) One (1) channel of audio to a wall connector assembly at the court reporter's position as indicated on the Drawings.
      - d) Recording of remote witness.

- e) Recording of all microphone mixer inputs (including interpretation) and auxiliary and program inputs.
- D. Assistive Listening and Language Translation Systems
- 1. All Hearing Rooms
    - a) Two (2) channels of composite audio from the sound system.
    - b) Modulated, dual-channel, infrared system for wireless broadcast of sound reinforcement and language translation capable of separate channel selection or mixed mode.
    - c) Portable, battery-operated multi-channel IR receivers with lightweight headsets for people requiring listening assistance or language translation.
    - d) Full duplex audio conferencing telephone hybrid for dedicated remote interpretation.
- E. Audio Conferencing
- 1. All Hearing Rooms
    - a) Full duplex communication from all courtroom audio sources through a VOIP circuit.
    - b) Far end audio signal played through sound reinforcement loudspeakers.
    - c) Where multiple hybrids are used the system shall be configured to allow both remote parties to hear each other and participate in an audio or video conference at the same time.

## PART 2 - PRODUCTS

### 2.1 GENERAL

- A. Quantities: Unless otherwise noted, quantities shall be as indicated on the Drawings.
- B. All equipment and material shall be new.
- C. Performance criteria or physical characteristics specified herein represent minimum acceptable values unless noted otherwise.
- D. Finish of all visible equipment shall be matte black, flat gray, or a similar non-reflective color unless otherwise specified herein or on the Drawings.

### 2.2 MICROPHONES AND ACCESSORIES

- A. General:
  - 1. Outputs of microphones shall be 150 ohms nominal, balanced with respect to ground.
  - 2. All microphones of the same type shall be from a single manufacturer.
  - 3. Finish of microphones and stands shall be matte black, flat gray, flat beige, or a similar nonreflective color.
- B. Gooseneck Microphones:
  - 1. Functionally designed for podium or desk applications.
  - 2. Transducer element: condenser.
  - 3. Polar pattern: Super cardioid.
  - 4. On-axis frequency response:  $\pm 3$  dB, 80 Hz to 15 kHz.

5. Open-circuit sensitivity:  $<-49$  dB re: 1V/Pa.
6. Signal-to-noise ratio:  $>65$  dB, 1 kHz at 1 Pa.
7. Maximum SPL:  $>140$  dB at 1 kHz, 1% total harmonic distortion.
8. Size: dual goosenecks with rigid center section, length as indicated on Drawings.
9. Options: provide shock mount or desk stand with integral programmable logic button as indicated on Drawings. Logic button shall be capable of being programmed for “push-to- talk”, “push-to-mute”, and latching “on/off” modes.
10. Provide (6) per hearing room, (18) total units
  - a) (1) for Judge
  - b) (1) Witness
  - c) (2) Plaintiff
  - d) (2) Defendant
11. Quantities identified are associated to the Base Bid. Double the quantities if Alternate #2 is accepted.
12. Manufacturer: Shure MX418D/S or approved equal.

C. UHF Wireless Systems:

1. General:
  - a) Operating RF carrier range: 470-932 MHz, varies by region.
  - b) System frequency response: 20 Hz to 20 kHz.
  - c) Line-of-sight operating range: 380' (100 m).
  - d) All quantities identified are associated to the Base Bid. Double the quantities if Alternate #2 is accepted.
  - e) Manufacturer: Shure or approved equal.
2. Receivers:
  - a) Quad receiver operation.
  - b) Rack mountable with remote mountable antennas.
  - c) 24-bit / 48kHz digital audio
  - d) Greater than 120dB dynamic range
  - e) 60 dB of adjustable system gain per channel
  - f) Digital predictive switching diversity
  - g) Up to 64 MHz overall tuning range
  - h) Up to 17 active transmitters in on 6 MHz TV channel
  - i) High Density mode enables up to 47 active transmitters in on 6 MHz TV channel
  - j) Optimized scanning
  - k) AES 256-bit encryption for secure wireless transmission
  - l) Ethernet networking for streamlined setup across multiple receivers
  - m) Provide (1) per hearing AV room, (3) total units.
  - n) Manufacturer: Shure, Model ULXD4Q-G50 or approved equal.
3. Handheld Transmitters:
  - a) Functionally designed for handheld, vocal applications.
  - b) Flat frequency response
  - c)  $>120$  dB dynamic range
  - d) AES 256-bit encryption
  - e) No transmitter gain adjustments needed – optimized for any input source
  - f) High Density mode enabled via IF sync

- g) Lithium-ion rechargeable battery – 11 hour battery life, precision metering and zero memory effect
  - h) Backlit LCD with easy to navigate menu and controls
  - i) 100 meters (300 feet) line-of-sight operating range
  - j) Rugged metal construction
  - k) Frequency and power lockout
  - l) Interchangeable microphone cartridges
  - m) Transmitter Mute Mode repurposes the on/off switch into a mute switch, enabling audio muting while preserving RF channel presence
  - n) Provide (1) per hearing room, (3) total units.
  - o) Manufacturer: Shure, Model ULXD2/SM58 or approved equal.
4. Body Pack Transmitters:
- a) Functionally designed for handheld, vocal applications.
  - b) Flat frequency response
  - c) >120 dB dynamic range
  - d) AES 256-bit encryption
  - e) No transmitter gain adjustments needed – optimized for any input source
  - f) High Density mode enabled via IF sync
  - g) Lithium-ion rechargeable battery – 11 hour battery life, precision metering and zero memory effect
  - h) Backlit LCD with easy to navigate menu and controls
  - i) 100 meters (300 feet) line-of-sight operating range
  - j) Rugged metal construction
  - k) Frequency and power lockout
  - l) Interchangeable microphone cartridges
  - m) 4-pin TQG connector
  - n) Transmitter Mute Mode repurposes the on/off switch into a mute switch, enabling audio muting while preserving RF channel presence
  - o) Detachable 1/4 wave antenna
  - p) Provide (3) per hearing room, (9) total units.
  - q) Manufacturer: Shure, Model ULXD1 or approved equal.
5. Earset Microphone
- a) Tan, omnidirectional flexible boom earset microphone
  - b) Transducer: Condenser
  - c) Polar Pattern: Omnidirectional
  - d) Frequency Response: 30Hz to 20kHz +/- 3dB
  - e) Signal-to-noise ratio: Equivalent Acoustic Noise: 29dBA SPL
  - f) Maximum input sound level: 130dB SPL
  - g) Power requirements: 500uA
  - h) Output impedance: 2k ohms
  - i) Output connectors: TA4-Female Connector compatible with wireless transmitter
  - j) Provide (3) per hearing room, (9) total units.
  - k) Manufacturer: Shure, Model WCE6iT or approved equal.
6. Dual docking charger station with power supply
- a) Lithium-ion charging system
  - b) Transmitters and receivers display remaining battery life in hours and minutes accurate to within 15 minutes

- c) Full charge within three hours and 50% charge in one hour
  - d) Charge status LEDs on each battery
  - e) To be compatible with transmitter, body pack and portable receiver
  - f) Provide (2) per hearing room, (6) total units.
  - g) Manufacturer: Shure, Model SBC200-US or approved equal.
7. Rechargeable batteries
- a) Lithium-ion batteries compatible with wireless transmitter and wireless body pack
  - b) Provide (4) per hearing room, (12) total units.
  - c) Manufacturer: Shure, Model SB900 or approved equal.
8. Antenna Splitters:
- a) Functionally designed to allow 2 antennas to serve all receivers with full diversity operation.
  - b) Compatible with antennas and receivers used.
  - c) Support the inputs and outputs as necessary to achieve optimum reception.

### 2.3 SOURCE EQUIPMENT

- A. General: Provide IHF Buffer Amplifiers for all devices which do not output professional audio levels.
- B. IHF Buffer Amplifiers:
- 1. Bi-directional interfaces.
  - 2. Frequency Response:  $\pm 0.25$  dB, 10Hz to 30 kHz.
  - 3. Total harmonic distortion:  $< 0.05\%$ .
  - 4. Crosstalk:  $< -80$  dB from 10Hz to 20 kHz.
  - 5. Headroom:  $> 18$  dB.
  - 6. Rack mountable.
  - 7. Manufacturer: Radio Design Labs model RU-LA2D or equivalent by Audio Technologies Inc.

### 2.4 MIXERS AND ASSOCIATED EQUIPMENT

- A. Automatic Microphone Mixers:
- 1. Electronically balanced and RF filtered inputs.
  - 2. Input impedance:  $> 2500$  ohms.
  - 3. Input gain:  $+15$ dB to  $-63$ dB, plus mute.
  - 4. Tone controls with low-cut 6 dB/octave filters and shelving high-frequency control.
  - 5. Inputs and outputs as shown on the drawings with selectable impedances of either 520 ohms balanced and 260 ohms unbalanced or 125 ohms balanced and unbalanced.
  - 6. Frequency response:  $\pm 1$  dB, 20 Hz to 20 kHz.
  - 7. Proprietary digital bus providing a 48 x 48 digital audio matrix and control to all units connected to the bus.
  - 8. Ethernet control.
  - 9. Total harmonic distortion:  $< 0.1\%$ .
  - 10. Automatic digital feedback eliminator.
  - 11. 9 filter stages plus compressor, limiter and delay on each output.

12. 6 filter stages plus compressor and delay on each input.
13. Input and output quantities shall be indicated in the Drawings.
14. Provide with Digital Audio Networking Card, (basis of design: Tesira Dan-1)
  - a) Utilized to allow interface to other audio devices via the Dante networking protocol
  - b) **Utilize the Dante network to connect all Tesira Servers and provide an audio input from the Security Monitoring Room to the system for all page from the Security Monitoring Room.**
15. Basis of design: Biamp Tesira Server IO

## 2.5 PROCESSING EQUIPMENT:

### A. General:

1. Noise (un-weighted): >85 dB below +4 dBu output from 20 Hz to 20 kHz.
2. Balanced inputs and outputs.
3. Input impedance: >15000 ohms.
4. Output impedance: <200 ohms.
5. +4 dBu operating level, nominal.
6. Maximum output level: +21 dBu minimum.
7. Frequency response:  $\pm 1$  dB, 20 Hz to 20 kHz.
8. Total harmonic distortion: <0.01% at +4 dBu output from 20 Hz to 20 kHz.

## 2.6 POWER AMPLIFIERS AND ASSOCIATED EQUIPMENT

### A. Power Amplifiers, Dual Channel:

1. Positive protection of components in event of input overload and/or output short circuit and/or output overload; withstand overdrive up to 10 dB and/or short-circuited output for 0.5 minute without causing blown fuses.
2. Sensitivity: 0.775V rms to 1.4V rms for full rated output at rated load.
3. Frequency response:  $\pm 0.2$  dB, 20 Hz to 20 kHz.
4. THD: 0.1%, 20 Hz to 20 kHz, without increase in distortion at lower output or less than rated load.
5. Output regulation: +3 dB, no load to rated load.
6. Noise: -105 dBA, rated output, 20 Hz to 20 kHz.
7. Slew rate: 17V per  $\mu$ sec into rated load.
8. Damping factor: 500 into rated load.
9. Balanced inputs.
10. Thermal, subsonic, ultrasonic, reactive load, and dc fault protection.
11. Momentary output mute at turn on.
12. Output level controls
13. Front panel power, clipping, and protection circuit activation LEDs.
14. Rack mountable.
15. Rear-mounted switch for constant 70V output.
16. Manufacturer: Crown.

## 2.7 CEILING/WALL LOUDSPEAKER EQUIPMENT

### A. General:

1. Loudspeaker, transformer, and enclosure of a single loudspeaker type shall be from a single manufacturer. and provided pre-assembled from the manufacturer.
2. Matching Transformers:
  - a) Insertion loss: 0.6 dB, maximum.
  - b) Frequency response:  $\pm 1$  dB, 60 Hz to 12 kHz.
  - c) Primary taps: 1, 2, 4, and 8 watt tap setting, minimum, or as required to provide minimum sound pressure level as specified herein.
  - d) Secondary impedance: 4 or 8 ohms as required to provide full power transfer to speaker used.
3. Manufacturer: Electro-Voice.

## 2.8 FLUSH MILLWORK MOUNTED LOUDSPEAKERS

### A. General:

1. Loudspeaker, transformer, and enclosure of a single loudspeaker type shall be from a single manufacturer. and provided pre-assembled from the manufacturer.
2. Enclosure type: Bass-reflex type
3. Rated input: 15 watts
4. Sensitivity: 87 dB (1W, 1m) at installation 1/2 free sound field
5. Speaker Component: Low frequency: 10cm cone-type / High frequency: Balance dome tweeter
6. Input terminal: push-in terminal
7. Coordinate under counter or flush in millwork mounting with millwork. Furnish and install all mounts, cables, connectors and accessories to provide a clean, professional installation of speakers in millwork.
8. Manufacturer: TOA F-1000BT or approved equal.

## 2.9 ASSISTED LISTENING SYSTEMS

### A. General:

1. IR infrared based, with audio inputs modulated onto one of two channels.
2. 2.3 / 2.8 MHz dual channel IR
3. Rack mount in each hearing room AV closet, provide with GA 1031-CC half width 19" blank module for mounting a single SI 1015 modulator into a 19" rack.
4. Manufacturer shall be Sennheiser SI 1015 with SZI 1015 power supply.

### B. IR Radiator:

1. 2 watt radiator and modulator for carrier frequencies 2.3 and 2.8 MHz
2. 2 watt radiator with a maximum coverage area of 400 meters squared
3. Modulator for single-channel, two-channel or stereo operation
4. Manufacturer shall be Sennheiser SZI 1015-TW

### C. Two Channel Stethoset IR Receiver

1. For stereo and two channel applications (2.3 / 2.8 MHz)
2. Balance control for setting the volume for the right and left ear
3. Receiver automatically turns on/off when it is put on/removed
4. Flexible earpads and low receiver weight
5. Lithium polymer battery technology for operating time of up to 12 hours
6. Base bid, provide (5) HDI 830 units and (5) HDI 830S units.

7. If Alternate #2 is accepted double the quantities.
8. Manufacturer shall be Sennheiser HDI 830 and HDI 830S to accommodate hearing aids
9. Earpads
  - a) Replaceable silicone ear cushions with foam inserts
  - b) Black
  - c) Provide (20) pair
  - d) Manufacturer shall be Sennheiser OP – Set 830

D. Battery Chargers:

1. Compatible with system used.
2. Provide enough chargers to simultaneously charge batteries for all provided receivers at once.
3. Manufacturer shall be Sennheiser L 300 10-10

E. Batteries:

1. Compatible with headsets used.
2. Provide 4 more batteries than number of receivers provided.

**2.10 TELEPHONE INTERFACE EQUIPMENT**

A. Telephone Hybrids:

1. Full duplex operation.
2. Compatible with automatic mixer specified.
3. Compatible with standard RJ45 VOIP modular telephone receptacles.
4. Communication with specified automatic mixer through local/proprietary bus without consuming an input or output bus.
5. Rack mountable.
6. Integral acoustic echo suppression providing at least 24 dB of suppression.
7. Frequency response:  $\pm 3$  dB from 300 Hz to 3.5 kHz.
8. RS-232 controllable.
9. Expansion bus for connection to other audio devices.
10. Manufacturer: same as Automatic Microphone Mixer.

**2.11 COURT RECORDING EQUIPMENT**

A. Digital Eight Track Desktop Recorder:

1. Eight channel software based PC recording.
2. Install software on owner provided computer at each Clerk's desk in the hearing rooms. This contractor is responsible to coordinate with the County and State IT departments for the installation and setup of recording software. The County and State IT departments will need to be present to allow for computer administrative modifications; this contractor is to provide adequate notice and coordination to the County and State to achieve the installation of this software.
3. Integral CD write capability.
4. LCD desktop RS-232/USB system clock, unit to be by Applied Technical System or approved equal and compatible with Liberty Court Recording.
5. PC 3.5mm connector for in-court playback from Judges' and Clerks' computer
6. Microphone inputs: 8, minimum.
7. Basis of design: Liberty Court Recorder.

- B. Digital Eight Track Software Recorder:
1. Units shall be software based and shall receive digital audio via an Ethernet based Dante soundcard.
    - a) Contractor to furnish and install Dante soundcard on owner provided computer.
    - b) Install soundcard on owner provided computer at each Clerk's desk in the hearing rooms. This contractor is responsible to coordinate with the County and State IT departments for the installation and setup of the soundcard. The County and State IT departments will need to be present to allow for computer administrative modifications; this contractor is to provide adequate notice and coordination to the County and State to achieve the installation of this hardware.
  2. On-screen controls
  3. Eight channel mixer circuitry.
  4. Save recordings to Clerk's computer hard drive.
  5. Basis of design: Liberty Court Recorder.
- C. USB 4-Port Extender:
1. USB 2.0 – LR
  2. 4-Port Extender
  3. Extends a USB source up to 100 meters (330 feet) using a single CAT5 cable
  4. Supports USB 2.0 with data rates up to 480 Mbps
  5. Backward-compatibility with USB 1.1
  6. Receiver unit – connection of up to (4) USB devices
  7. Manufacturer shall be Gefen USB 2.0 LR or approved equal

## 2.12 CABLES, CONNECTORS AND MISCELLANEOUS EQUIPMENT

- A. The Contractor shall provide an itemized list of any miscellaneous equipment required to complete the successful installation of the above mentioned electronic systems. This list should include, but is not limited to:
1. Audio cables and connector assemblies.
  2. Mounting hardware including rack ears or mounting kits, screws, etc.
  3. Tie wraps, distribution rings, etc.
  4. Power supplies.
- B. Receptacles and Connectors:
1. Receptacles and connectors referred to as XLR type shall conform to EIA 297-A-1970.
  2. Line level: 3-pin locking XLR or 6 mm diameter tip/ring/sleeve phone type.
  3. Microphone level: 3-pin locking XLR type.
  4. Loudspeaker level: 6 mm diameter tip/sleeve phone type.
  5. Manufacturer: ITT Cannon, Neutrik, or Switchcraft.
- C. Microphone and Line Level Cables:
1. #22 AWG conductors.
  2. Capacitance: 34 pF/ft (112 pF/m) between conductors.
  3. Twisted pair, stranded, color-coded conductors.
  4. 100% overall shield with stranded copper or tinned-copper drain wire.
  5. Insulated.
  6. Manufacturer: Belden, Liberty, or West Penn.

- D. Loudspeaker Cables:
  - 1. #18 AWG conductors.
  - 2. Twisted pair, color-coded, stranded conductors.
  - 3. Insulated.
  - 4. Unshielded.
  - 5. Manufacturer: Belden, Liberty, or West Penn.Audio Cables
- E. RJ-45 Connectors: RJ-45 Connectors shall be (8) position non-keyed modular type, category 5e compliant. Connectors shall comply with FCC Part 68, R1998, be UL listed and CSA certified, have a plug insertion life of 750 insertions, a contact force of 99.2 g minimum using FCC-approved modular plug, a plug retention force of 133 N minimum between modular plug and jack.
- F. Fiber optic Jacks and Connectors: Fiber optic Jacks and Connectors shall be duplex MT-RJ, LC, or opti-jack type. Fiber optic connectors to multimode fiber shall utilize a field installable no epoxy no polish method or an anaerobic adhesive method.

### PART 3 - EXECUTION

#### 3.1 MICROPHONES AND ACCESSORIES

- A. Wireless microphone antennas shall be located to provide drop-out free performance over the entire area being served.
- B. Wireless microphone handheld transmitters shall be labeled indicating the space in which the receiver is located.
- C. Provide phantom power as required per manufacturer's specifications.

#### 3.2 AUTOMATIC MICROPHONE MIXERS

- A. Use macros for programming bench conference functionality. Do not use presets. There shall be no delay when switching in and out of bench conference mode.
- B. Local interpreter feature shall be wired directly to the mixer, and not the control processor.

#### 3.3 PROGRAM SOURCE AND RECORDING EQUIPMENT

- A. Provide level interfaces for sources not having nominal +4 dBu, balanced outputs.

#### 3.4 CONTROL AND SIGNAL PROCESSING EQUIPMENT

- A. Control and signal processing equipment shall be mounted in the equipment rack unless otherwise specified herein.
- B. Signal processing equipment with front panel controls which are to be permanently adjusted (not normally adjusted by the operator), including equalizers, compressor/limiters, crossovers, and audio delays, shall be furnished with security panels or sub-panels mounted behind blank panels. Provide plastic vision panels for

viewing of indicators, meters, and clipping indicators.

- C. Terminate unused mixer inputs and outputs at terminating patch panels and label accordingly.

### 3.5 CEILING/WALL LOUDSPEAKER EQUIPMENT

- A. Loudspeakers shall be located as indicated on the Drawings, with minor changes, not to exceed 12" (300 mm) in any direction unless approved by the Architect Engineer.
- B. Mount matching transformers inside loudspeaker enclosures, attached to loudspeaker or enclosure, as per manufacturer's recommendations.
- C. Connect matching transformer taps for wattages indicated on the Drawings.
- D. Sound Pressure Level (SPL): 20 dB above ambient noise on-axis at ear height, minimum.
  - 1. Ear height, sitting: 48" (1220 mm).
  - 2. Ear height, standing: 60" (1524 mm).
- E. Loudspeaker coverage: provide even coverage  $\pm 6$  dB at 1 kHz octave band off-axis throughout the space.

### 3.6 PROGRAM LOUDSPEAKERS AND ASSOCIATED EQUIPMENT

- A. Loudspeakers shall be located as indicated on the Drawings, with minor changes, not to exceed 300 mm in any direction unless approved by the Contracting Officer.
- B. Paint loudspeaker grilles to match finish of mounting surface.
- C. Loudspeaker distribution lines shall be separate where indicated on the Drawings, and shall be installed in conduit.
- D. Permanently mounted loudspeakers, other than ceiling-mounted, shall incorporate 50 durometer neoprene vibration isolation pads loaded to 275 kPa.
- E. Loudspeaker enclosures shall be supported from the building structure, or from the ceiling suspension system in acoustical tile ceilings.
- F. Repair damage to existing fireproofing to provide protection equivalent to original.

### 3.7 AUDIO SYSTEM PERFORMANCE TESTS:

- A. General:
  - 1. Interior finishes and furnishings shall be in place for these tests.
  - 2. Documentation of performance tests shall be maintained for reference during the system acceptance tests.
  - 3. Tests and adjustments shall be performed in the sequence specified herein.
  - 4. Provide buffer amplifiers or fixed attenuation pads to meet the signal levels specified herein.
  - 5. Tests may include subjective viewing and listening at various positions under

various operating conditions, using live or recorded material.

B. Impedance:

1. Measure absolute impedance value of each loudspeaker line at 250, 500, 1000, and 2000 Hz without the amplifier connected but with all speakers connected. Record the impedance levels versus frequency for each loudspeaker line.
2. Impedance must not be below the rated load impedance of respective amplifier and may be any value equal to or above that.
3. Check the resistance of the lines for loudspeaker, line level, and microphone receptacles with the receptacles opened and shorted. Document and repair any shorts or discontinuities found.

C. Polarity:

1. Verify the polarity of each device in the shop to obtain true polarity throughout the system.
2. Verify and document that polarity is kept throughout the system after wiring from inputs through output devices or receptacles.

D. Gain Structure:

1. Turn off amplifiers and set equalizers and filter controls to flat response. Do not bypass any equalizers or filters.
2. Adjust compressors and limiters to a 1:1 compression ratio and a +10 dBu limiting threshold. Do not bypass these processors.
3. Insert pink noise into the mixer or mixing console and adjust levels to obtain a 0 dBu reading for the mixer or mixing console output. Distribute this output to all systems and subsystems.
4. Adjust the output of line level electronics and signal processors to obtain a 0 dBu output at the output terminals. For equipment with input level controls, adjust the input controls so that input levels peak at -10 dB. For equipment not capable of providing 0 dBu output, adjust to achieve as close to 0 dBu as possible.
5. Turn amplifier gain controls to minimum and turn on the power amplifiers. Adjust the gain controls to achieve a +4 dBu output level for low impedance amplifiers and a +18 dBu output level for high impedance or constant voltage amplifiers.

E. Hum and Noise Level:

1. Without changing the gain, terminate microphone and line level inputs with proper shielded resistors of 150 and 600 ohms respectively.
2. Measure and record overall hum and noise levels for each power amplifier output from each input and with all inputs simultaneously. Hum and noise shall be at least 50 dBA below rated power output levels with amplifier controls set for optimum signal-to-noise, using input from line level and microphone sources.

F. Electrical Distortion:

1. Load amplifier outputs with appropriate resistors matching the nominal impedance of the output terminals in place of the actual loudspeaker loads.
2. Adjust gain controls as for hum and noise level test.
3. Apply 250 Hz, 500 Hz, 1 kHz, and 2 kHz sine wave signal from an oscillator with less than 0.01% Total Harmonic Distortion to one input, such that a level of 0 dBu is obtained on the mixer.
4. Measure and record the electrical distortion at each power amplifier output.

Distortion shall be less than 0.5%.

- G. Parasitic Oscillation and Radio Frequency Pick-up:
1. Set up system for each specified mode of operation.
  2. Using a 5 MHz bandwidth oscilloscope and loudspeaker monitoring.
  3. Ensure that the system is free from spurious oscillation and RF pick-up with the absence of any input signal and with a 160 Hz signal at a 0 dBU level on the mixer or mixing console.
  4. Repeat this test for each mode of operation of the lighting dimmers (incandescent, neon, and fluorescent).
- H. Background Noise:
1. Using a calibrated ANSI S1.4-1983 (1997) Type 1 or IEC 60651-01-1994, precision sound level meter, determine the average ambient noise level in the room. Record the level derived. The average background noise shall be 60 dBA or below during performance of the following tests. If noise level exceeds this criterion, promptly notify the Government before proceeding further.
- I. Buzzes and Rattles:
1. Apply a 1 kHz sine wave signal such that a 0 dBU level is obtained on the mixer or mixing console.
  2. Sweep loudspeaker systems from 50 Hz to 5 kHz at 6dB below full amplifier power. Listen for buzzes, rattles, vibrations or resonance. Locate and correct problems.
  3. If the cause is outside the system, promptly notify the Government, indicating the cause and recommended corrections.
- J. Coverage:
1. Using pink noise as an input, adjust loudspeakers and output levels to provide  $\pm 6$  dB coverage in the octave band centered at 1 kHz throughout the areas served by the system.
  2. Measure and record results.
- K. Equalization:
1. Equalize the sound systems in order to provide uniform seat-to-seat response, raise the threshold of feedback, suppress ring modes, and insure natural, pleasing sound in equal and adequate amplitude with maximum degree of intelligibility, and provide performance conforming to the requirements specified under "Acceptance Testing."
  2. Turn off systems except the speaker system under test.
  3. Using pink noise as an input and with system equalizers set to bypass operation, determine the average frequency response of the loudspeaker system in the room using a 1/3 octave real time analyzer.
  4. Record the frequency response derived.
  5. Locate the analyzer microphone approximately 1 m above the floor at a point which approximates the average frequency response, within  $\pm 3$  dB from 50 Hz to 16 kHz.
  6. Record the frequency response at this location.
  7. Using pink noise as an input and with system equalizers set to normal operation, set low and high pass filters at 63 Hz and 16 kHz respectively.
  8. Adjust the 1/3 octave filter settings to obtain the following response curves,

minimizing the variation ( $\pm 3$  dB) between adjacent filter settings:

- a) Roll off -6 dB per octave below 125 Hz.
- b) Maintain  $\pm 3$  dB, 125 Hz to 4 kHz.
- c) Roll off -3 dB per octave from 4 kHz to 12 kHz.
- d) Roll off sharply above 12 kHz.
- e) With any system microphone open, make minor adjustments to maximize gain before feedback. No more than 3 filter settings shall be adjusted.
- f) Record the frequency response derived.

L. System Input and Output Levels:

1. Using pink noise source material and a calibrated ANSI S1.4-1983 (1997) Type 1 or IEC 60651-01-1994, precision sound level meter, perform the following:
  - a) For microphone level inputs: locate a pink noise source at a distance of 300 mm from the corresponding system microphone. Adjust the pink noise source to provide a level of 75 dBA at the microphone and set mixer levels to achieve a 0 dBu level at the mixer output.
  - b) For line level inputs: use system program source equipment, with pink noise playback media, as a direct input to the mixer or mixing console and set mixer levels to achieve a 0 dBu level at the mixer output. Repeat for each system input individually where mixer inputs vary in input sensitivity. Settings for equivalent sensitivity inputs may be duplicated.
  - c) With any input set as specified above, adjust audio distribution amplifiers to provide levels of -10 dBu at each output.
2. Measure and record results.

M. Feedback Stability:

1. With required output levels set, measure and record the available gain before feedback. Feedback stability margin shall be 6 dB, minimum.

N. Intelligibility:

1. Using a TEF analyzer, measure the percent articulation loss of consonants (% ALcons) for at least 4 various locations in the room in the 2000 Hz octave band.
2. % ALcons shall be less than 10 for each location.
3. Record results.

O. Assistive Listening Systems:

1. Set gain so that normal speech or music does not over modulate the transmitter.
2. Adjust emitter panels to provide even coverage throughout the courtroom.

END OF SECTION

SECTION 113011 – VIDEO SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Specialty systems general provisions are specified in Section 113000, Audiovisual Systems General.
- B. This Section covers video systems.

1.2 SYSTEM DESCRIPTION

- A. Video and Graphics Presentation
  - 1. All Hearing Rooms, Training Rooms and Conference Rooms
    - a) Computer video interfaces, cables and wall/floor/ceiling connector assemblies at locations designated on the Drawings.
    - b) Video Display liquid crystal display (LCD) type monitors at locations designated on the Drawings. (Owner provided / Owner installed)

PART 2 - PRODUCTS

2.1 GENERAL

- A. Quantities: Unless otherwise noted, quantities shall be as indicated on the drawings.
- B. All equipment and material shall be new.
- C. Performance criteria or physical characteristics specified herein represent minimum acceptable values unless noted otherwise.

2.2 CABLES, CONNECTORS, AND MISCELLANEOUS EQUIPMENT

- A. General:
  - 1. The following connectors in plates shall be barrel or pass-through type, unless otherwise indicated on the Drawings:
    - a) BNC type connectors.
    - b) RCA type connectors.
    - c) Tri-Lock type connectors.
    - d) S-video mini-din connectors.
  - 2. Provide DVI to HDMI (or vice versa) adapters or adapter cables as required to complete required connectivity.
- B. Shielded CAT6 RJ-45 Panel-Mount Couplers:
  - 1. For use with Digital Media Cable Connectors.
  - 2. Basis of design is the Black Box FMT1021, or equivalent by Neutrik, Switchcraft, Crestron, or Canare.
- C. HDMI and DVI Cables:

1. Connectors where indicated on the drawings.
  2. Pre-made lengths to satisfy distance and placement as identified in the drawings.
  3. Basis of design: Extron or Crestron.
- D. HDMI to DVI and DVI to HDMI adapters:
1. Functionally designed to convert DVI to HDMI.
  2. May be in connector form or cable form as required by the design.
  3. Basis of design: Extron, Gefen, Key Digital, or Crestron.
- E. Shielded Category 6 Cables
1. Class 2 or CM rated for nonplenum use; Class 2P or CMP for plenum use per NFPA 70- 2008 with Georgia State Amendments-2009.
  2. Shall meet TIA/EIA 568-B1-B3, with addenda, component level requirements for shielded category 6 cable.
  3. Conductors: #23.5 AWG solid copper, minimum.
  4. Nominal Capacitance: 14.0 pF/ft.
  5. Impedance 100 ohms.
  6. Propagation delay skew: less than or equal to 45ns/100m.
  7. Nominal OD: 0.270"
  8. Manufacturer: Kramer, Belden, or Extron.
- F. D-Sub Type Connectors:
1. Voltage rating: 1000V rms.
  2. Current rating: 1.5 amperes.
  3. Two- or three-piece construction with crimp rings and crimp or solder center pins.
  4. Brass, brass alloy, or stainless steel construction with tarnish-resistant finish.
  5. Connectors shall match video cables based on cable manufacturer's recommendations.
- G. Telephone and intercom cables shall be #22 AWG solid 3 twisted pair type.
- H. Computer breakout cables shall be as recommended by computer interface equipment manufacturer. Breakout cables shall include audio where accepted by the computer interface.

### PART 3 - EXECUTION

#### 3.1 GENERAL:

- A. Video signals shall be scaled or scan converted as necessary to provide the native resolution signal to display and video capture devices.
- B. Whenever possible a common native resolution shall be determined for each space and shall be provided to every display in the system.

#### 3.2 VIDEO AND DATA MONITORS/RECEIVERS AND ASSOCIATED EQUIPMENT:

- A. Video and data monitors/receivers shall be selected to match the native resolution of the system, unless otherwise specified herein.
- B. Configure monitors to provide full images at the room's native resolution. Verify

color timing.

**3.3 CABLES, CONNECTORS, AND MISCELLANEOUS EQUIPMENT:**

**A. Digital Cables and Connections:**

1. Within an equipment rack, where premade cables are used, provide the shortest cable required to complete each circuit. If cable must be coiled within an equipment rack, coil cables in such a manner that does not block access to the rear of the equipment.

**3.4 VIDEO PERFORMANCE TESTS AND ADJUSTMENTS:**

**A. General:**

1. Adjust, balance, and align equipment for optimum quality and to meet the manufacturer's published specifications.

**B. Performance Standards:**

1. Unless restricted by the published specifications of a particular piece of equipment, or unless specified otherwise herein, the following performance standards shall be met by each system:
  - a) Digital video signals shall be:
    - 1) Tested for HDCP compliancy issues. Correct any issues found. Report any issues requiring additional equipment or the replacement of a major piece of equipment to the Architect / Engineer.
    - 2) Free of digital noise, pixellation, and artifacts.
    - 3) Tested for proper EDID configuration so that images fill screen using scalers internal to each display.
  - b) All video images shall be:
    - 1) Free from banding where bands of the video image are at incorrect intensities.
    - 2) Free from bending at the corners due to synchronization problems.
    - 3) Free from outlining due to timing issues and component signals being out of convergence.
    - 4) Free from ghosting or reflections due to improper termination and impedance mismatching.
    - 5) Free from video roll due to ground loops and improper grounding.
    - 6) Free from visible jitter due to an instable synchronization signal.
    - 7) Free from double images due to improper scan rates.
  - c) Video, Signals:
    - 1) S/N (peak-to-rms) unweighted dc to 4.2 MHz: 55 dB minimum.
    - 2) Crosstalk, unweighted dc to 4.2 MHz: 55 dB minimum.
    - 3) Video Signal Strength:
      - a) Composite video: 1V peak-to-peak, nominal.
      - b) S-video: 0.7V peak-to-peak, nominal.
      - c) Component video: 0.7V peak-to-peak, nominal.
      - d) Computer: RGB 0.7, peak-to-peak, nominal, H and V, 5V (TTL).
    - 4) Receptacle voltage level for RF signal outlets: 6.0 dBmV,  $\pm 3.0$  dB.
    - 5) Line and field tilt: 2% maximum.
    - 6) Differential gain: 3% maximum.
    - 7) Differential phase: 2° maximum.
  - d) Video, Timing:
    - 1) System synchronization coincidence shall be within 50 nanoseconds.

- 2) NTSC color timing shall be within 2° at 3.58 MHz.
- 3) Computer (RGBHV) color timing shall be within 1 pixel at system resolution.
- 4) Video timing shall be achieved without readjustment of source phasing.
- 5) Delay units, active or passive, shall be provided, if necessary, to achieve proper timing.

C. Video Display Adjustments:

1. For the following tests and adjustments, test signals provided by the signal generator shall be injected into the system from the primary presentation location and displays optimized from this location.
2. Image Sizing:
  - a) Using a crosshair or crosshatch pattern, adjust display device to show full image at system resolution.
3. Black Level:
  - a) Use a signal generator to provide a picture line up generating equipment (PLUGE) test pattern on the display to be adjusted.
  - b) Adjust the brightness control upward until the "blacker-than-black" bar is visible on the screen.
  - c) Decrease the brightness control slowly until this bar becomes fully extinguished. Continue until the test pattern background reaches the same point, i.e. no light output.
  - d) The remaining vertical bar should be dimly visible. Record the value of the onscreen display.
4. System Gain:
  - a) Use a signal generator to provide a PLUGE test pattern on the display to be adjusted.
  - b) Adjust the contrast control until the 100% white bar begins to bloom or distort in size or stops getting brighter.
  - c) Decrease the contrast control until the white bar is at the threshold of maximum brightness without any of these distortions.
  - d) Record the value of the onscreen display.
  - e) Perform Black Level and System Gain tests until there is no additional interaction between contrast and brightness control adjustments and record the final onscreen values for contrast and brightness.
5. Color Level or Gain:
  - a) Use a signal generator to provide a SMPTE color bars test pattern on the display to be adjusted.
  - b) Adjust the color level, individually if possible, until each channel's large bar blends with the small patch underneath.
  - c) Record the onscreen value for color level(s).
6. Color Phase:
  - a) Use a signal generator to provide a SMPTE color bars test pattern on the display to be adjusted.
  - b) While viewing the blue channel information only, adjust the tint control until the large internal bars blend with their patch below.
  - c) Perform Color Level and Color Phase tests until there is no additional color or tint control interaction and record the final onscreen values for color and tint.

END OF SECTION



SECTION 113012 – MEDIA CONTROL SYSTEM

PART 1 - GENERAL

1.1 SUMMARY

- A. Specialty systems general provisions are specified in Section 113000, Audiovisual Systems General.
- B. This Section covers media control systems.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Quantities: Unless otherwise noted, quantities shall be as indicated on the drawings.
- B. All equipment and material shall be new.
- C. Performance criteria or physical characteristics specified herein represent minimum acceptable values unless noted otherwise.
- D. All control components of a similar type shall be of the same manufacturer.
- E. Manufacturer: Crestron AV3, based on existing Crestron controls equipment.

2.1 CENTRAL CONTROLLERS

- A. General:
  - 1. Rack mountable.
  - 2. Programmable control assignment and configuration.
- B. Integrated Controllers:
  - 1. Functionally designed with ports integrated into one off the shelf product.
  - 2. Ports as indicated herein
  - 3. Expandable via Control Cards.
- C. Control System:
  - 1. Control Engine:
    - a) 3- Series
    - b) Running real-time, preemptive multi-thread / multitasking kernel
    - c) Transaction-Safe Extended FAT file system
    - d) Supports up to 10 simultaneously running programs
  - 2. Memory:
    - a) SDRAM: 1GB
    - b) Flash: 4GB
    - c) Memory Card: supports SD and SDHC cards up to 32GB
    - d) External Storage: supports USB mass storage devices up to 1TB
  - 3. Communications:

- a) Ethernet: 10/100/1000 Mbps, auto-switching, auto-negotiating, auto discovery, full/half duplex, industry-standard TCP/IP stack, UDP/IP, CIP, DHCP, SSL, TLS, SSH, SFTP (SSH File Transfer Protocol), FIPS 140-2 compliant encryption, IEEE 802.1X, SNMP, BACnet™/IP[2], IPv4 or IPv6, Active Directory authentication, IIS v.6.0 Web Server, SMTP e-mail client Control Subnet: 10/100/1000 Mbps Ethernet, auto-switching, autonegotiating, auto-discovery, full/half duplex, DHCP server, DNS Server, port forwarding, Isolation Mode
  4. USB: Supports USB mass storage class devices via rear panel USB 2.0 host port, supports computer console via front panel USB 2.0 device port RS-232/422/485: For 2-way device control and monitoring, all ports support RS-232 up to 115.2k baud with software handshaking, two ports also support hardware handshaking, RS-422, and RS-485
  5. IR/Serial: Supports 1-way device control via infrared up to 1.2 MHz or serial TTL/RS-232 (0-5 Volts) up to 115.2k baud
- D. Connectors and Card Slots:
1. S1 – S3: (3) 3-Series control card expansion slots
  2. COM 1 – 2: (2) 5-pin 3.5mm detachable terminal blocks; Bidirectional RS-232/422/485 ports; up to 115.2k baud; hardware and software handshaking support
  3. COM 3 – 6: (4) 3-pin 3.5mm detachable terminal blocks; Bidirectional RS-232 ports; up to 115.2k baud; software handshaking support
  4. IR - SERIAL OUTPUT 1 – 8: (2) 8-pin 3.5mm detachable terminal block comprising (8) IR/Serial output ports;
  5. IR output up to 1.2 MHz; 1-way serial TTL/RS-232 (0-5 Volts) up to 115.2k baud
  6. RELAY OUTPUT 1 – 8: (2) 8-pin 3.5mm detachable terminal blocks comprising (8) normally open, isolated relays; Rated 1 Amp, 30 Volts AC/DC; MOV arc suppression across contacts
  7. LAN: (1) 8-wire RJ45 jack; 10Base-T/100Base-TX/1000Base-T Ethernet port; connects to the County's LAN
  8. CONTROL SUBNET: (1) 8-wire RJ45 jack; 10Base-T/100Base-TX/1000Base-T Ethernet port; provides a dedicated local network for Crestron devices
  9. USB: (1) USB Type A female; USB 2.0 port for storage devices
  10. MEMORY: (1) SD memory card slot; Accepts one SD or SDHC card up to 32 GB for memory expansion
  11. I/O 1 – 8: (1) 9-pin 3.5mm detachable terminal block comprising (8) "Versiport" digital input/output or analog input ports (referenced to GND); Digital Input: Rated for 0-24 Volts DC, input impedance 20k Ohms, logic threshold >3.125V low/0 and <1.875V high/1; Digital Output: 250mA sink from maximum 24 Volts DC, catch diodes for use with "real world" loads; Analog Input: Rated for 0-10 Volts DC, protected to 24 Volts DC maximum, input impedance 21k Ohms with pull-up resistor disabled; programmable 5 Volts, 2k Ohms pull-up resistor per pin
  12. NET: (1) 4-pin 3.5mm detachable terminal block; Cresnet master port, outputs power to Cresnet devices
  13. 100-240V~2.4A 50/60Hz: (1) IEC 60320 C14 main power inlet; Mates with removable power cord
  14. G: (1) 6-32 screw, chassis ground lug
  15. COMPUTER (front): (1) USB Type B female; USB 2.0 computer console port; for setup only
- E. Controls and Indicators:
1. PWR: (1) Green LED, indicates operating power supplied from AC line
  2. NET: (1) Amber LED, indicates communication with the Cresnet system

3. MSG: (1) Red LED, indicates control system has generated an error message
4. HW-R: (1) Recessed pushbutton for hardware reset
5. SW-R: (1) Recessed pushbutton for software reset
6. CNPS FAULT: (1) Red LED and (1) pushbutton, LED indicates an excessive Cresnet load detected at the NET port, pushbutton resets the fault indication
7. SLOT 1 – 3: (3) Green LEDs, indicate control cards are inserted in the corresponding slots
8. LAN (rear): (2) Bi-color green/amber LEDs, left LED indicates Ethernet link status and connection speed, right LED indicates Ethernet activity
9. CONTROL SUBNET (rear): (2) Bi-color green/amber LEDs, left LED indicates Ethernet link status and connection speed, right LED indicates Ethernet activity

## 2.2 XPANEL CONTROL APPLICATION

### A. Computer based control:

1. Provide virtual Crestron touch screen control on owner provided computers
2. Compatible with Windows platform
3. Set up to run as a desktop application on the Judges' and Clerk's computers.
4. Shall support Smart Graphics
5. Capable of being generated instantly from an existing touch screen
6. Communication to be directly over IP with Crestron control system

## 2.3 CABLES, CONNECTORS, AND MISCELLANEOUS EQUIPMENT:

### A. Control Cables:

1. Class 2 or CM rated for non-plenum use; Class 2P or CMP for plenum use per NFPA 70- 2002.
2. Two part construction in common jacket.
3. Data conductors: #20 AWG stranded bare copper, minimum.
4. Data shield: foil with tinned copper drain.
5. Data nominal capacitance: 13 pF/ft, (40 pF/m), maximum.
6. Power conductors: #18 AWG stranded bare copper, minimum.
7. Power shield: foil with tinned copper drain.
8. Nominal outside diameter: 0.032' (0.813 mm).
9. Voltage rating shall be 200V, ac or dc, minimum except that where cable is pulled in the same raceway with non-energy limited systems
10. Manufacturer: Belden, Liberty 22-18-1PSH-2C/22-18-1PSH-2C-P or West Penn.

### B. Control Connectors: Keyed 10-pin RJ-45 type connectors or 4-pin mini-XLR type connectors.

## PART 3 - PART 3: EXECUTION

### 3.1 GENERAL

- #### A. Unless otherwise indicated on the Drawings, devices should be controlled by the first protocol provided by the device manufacturer from the following list:
1. Bidirectional hardwired serial control.
  2. Unidirectional hardwired serial control.
  3. Hardwired infrared emitter over infrared receiver on device.

4. Contact closure(s) or relay(s).

### 3.2 CENTRAL CONTROLLERS

- A. Central processing equipment shall be mounted in the equipment racks and control console, as indicated on the Drawings, unless otherwise specified herein.
- B. Feedback will be provided via programming code to all control panels capable of receiving and displaying feedback from each feature or set of features found on the control panel for which device feedback is possible. When direct feedback is not possible because the controlled device does not provide it, or because the control protocol used to control the device does not allow for bidirectional communication, state variables shall be used in the programming code to provide feedback and discrete command used to control device.
- C. Programming to be similar to Crestron touch screen

### 2.4 XPANEL CONTROL APPLICATION

- A. Set up XPanel Control Application to run as a desktop application on the Judges' and Clerk's computers.
  1. Install software on owner provided computer at each Clerk's and Judge's desk in the hearing rooms.
  2. This contractor is responsible to coordinate with the County and State IT departments for the installation and setup of control software. The County and State IT departments will need to be present to allow for computer administrative modifications; this contractor is to provide adequate notice and coordination to the County and State to achieve the installation, set up and programming of this software.

### 3.3 CABLES, CONNECTORS, AND MISCELLANEOUS EQUIPMENT

- A. Connect control cables to equipment racks or cabinets via manufacturer recommended terminal blocks.
- B. No signal or control lines shall leave a rack or cabinet without connecting via terminal blocks.

### 3.4 PROGRAMMING

- A. Coordinate control system functionality for all hearing room with Using Agency. Provide adequate time to meet with, define and document XPanel controls as determined by the Using Agency. Provide adequate time to program the Xpanel controls application as defined by the Using Agency. No additional costs are to be incurred for any changes, additions or modification to the XPanel controls application as requested by the Using Agency.
- B. Provide web control and access of all touch panels and processors.
- C. Minimum specific functionality:
  1. Main push button application control:

- a) Two buttons for program volume up and volume down.
  - b) Two buttons for speech volume up and volume down.
  - c) One button which will toggle to an “all mute” mode which will mute all audio sources to all outputs. When the user toggles out of the “all mute” mode the system must return to exactly where it was prior to entering the “all mute” mode.
  - d) One button which will return the audio system to a defined preset.
  - e) One button which will toggle the system in and out of “bench conference” mode. Toggling out of “bench conference” mode shall return the system to its previous state prior to entering “bench conference” mode.
  - f) Two buttons for video display on, video display off.
  - g) All relevant icons located on control application shall be use to provide the user with visual feedback. This includes the use of bar graphs to show current audio levels.
2. Main application screen control panel:
- a) A “start-up page” with owner’s logo in the center of the screen. Selecting with a cursor anywhere on the screen will cause the “main page” to be displayed. If the system is idle for a period of time to be coordinated with the owner, the application screen control panel will return to this screen. If the screen is activated with a cursor pick when the system is “off” the pick will cause a prompt for user verification and sequence on the power to the system before displaying the “main page”.
  - b) A “main page” with two buttons for program volume up and volume down, two buttons for speech volume up and down, one button which will toggle to an “all mute” mode as described above, and a “system off” button which will cause a prompt for user verification and sequence off the power to the system and return to the “start- up page”. All volume controls shall have a bar graph or numeric indication of the current level.
  - c) A “cleaning” page that, when pressed, causes the screen to go to a blank page with the word “cleaning” along with a countdown timer. The cleaning page shall be active for a period of 15 seconds, after which the system shall automatically return to its previous state.
  - d) An “audio setup” page or pages with up/down/mute volume control of every audio source and output in the system. This page should also have a button to recall a preset configuration as configured at the time the system is accepted and four additional buttons to store and restore user presets. These presets will not override the mute status of microphones when the system is in the “all mute” mode described herein. In this case volume control shall remain adjustable. All volume controls shall have a bar graph or numeric indication of the current level.
  - e) A “telephone” page with
    - 1) the ability to dial numbers with all ten digits in a similar layout to a telephone including the pound and star keys, connect (dial or answer), disconnect, and store ten numbers in a dialing directory in presets 0 through 9 and dial them by dialing their preset number. This page shall also have conferencing controls for adding others into calls, including, but not limited to, the ability to add or not add the additional party after dialing without disconnecting from the rest of the conference.
    - 2) To support the remote interpretation feature of the audio system, the “telephone” page shall have a latching button labeled “Remote Interpretation Mode.” This button shall cause the audio of hybrid #2 to be sent only to the

- second language channel of the assistive listening system and all sources to be muted to the second hybrid except the headset microphone. Releasing this button shall cause the system to revert to its previous state prior to entering "remote interpretation mode." When not in "remote interpretation mode," hybrid #2 shall function as a second normal teleconferencing source.
- f) A "video" page with:
    - 1) Source select buttons for all input sources and full shuttle control buttons including, but not limited to: on, off, menu, volume, play, stop, pause, fast forward, rewind, record, next track, previous track, all numbers, direction arrows, etc.. The shuttle controls shall not vary in position or number, but if the selected source equipment does not support one or more of the controls they shall appear grayed out to indicate they are not available. The buttons shall reflect feedback in true bi-directional control of the device such that buttons shall provide constant feedback by permanently changing colors to indicate the state the source equipment is in. Provide an RS-232 serial connection from the Crestron controller to the Monitor in the hearing room to allow control of the TV Monitors from the Judges' or Clerks' workstations.
    - g) For future use, provide a "video conference" page with codec controls including, but not limited to, the ability to initiate and receive video calls, and store and dial preset video numbers. The video conference page shall also allow the user to select from a minimum of sixteen (16) window arrangement presets from the video multiplexer. Final window arrangement presets shall be determined by the Owner.
    - h) A "help page" that provides contact information for appropriate Court support staff persons. Coordinate specific contact information with the Owner.

END OF SECTION 113012

## SECTION 11 5213 - PROJECTION SCREENS

### 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. Electrically operated, front-projection screens and controls.
- B. Related Requirements:
  - 1. Section 09 5113 "Acoustical Panel Ceilings" for ceiling panels and trim mounted below projection screen case.

#### 1.3 DEFINITIONS

- A. Gain: Ratio of light reflected from screen material to that reflected perpendicularly from a magnesium carbonate surface as determined per SMPTE RP 94.
- B. Half-Gain Angle: The angle, measured from the axis of the screen surface to the most central position on a perpendicular plane through the horizontal centerline of the screen where the gain is half of the peak gain.

#### 1.4 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: Show layouts and types of front-projection screens. Include the following:
  - 1. Drop lengths.
  - 2. Location of seams in viewing surfaces.
  - 3. Location of screen centerline relative to ends of screen case.
  - 4. Anchorage details, including connection to supporting structure for suspended units.
  - 5. Details of juncture of exposed surfaces with adjacent finishes.
  - 6. Location of wiring connections for electrically operated units.
  - 7. Wiring diagrams for electrically operated units.
  - 8. Accessories.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For front-projection screens to include in maintenance manuals.

## 1.6 DELIVERY, STORAGE, AND HANDLING

- A. Environmental Limitations: Do not deliver or install front-projection screens 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.

## 1.7 COORDINATION

- A. Coordinate layout and installation of front-projection screens with adjacent construction, including ceiling suspension systems, light fixtures, HVAC equipment, fire-suppression system, and partitions.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Source Limitations for Projection Screens: Obtain front-projection screens from single manufacturer. Obtain accessories, including necessary mounting hardware, from screen manufacturer.

### 2.2 ELECTRICALLY OPERATED, FRONT-PROJECTION SCREENS

- A. General: Manufacturer's standard units consisting of case, screen, motor, controls, mounting accessories, and other components necessary for a complete installation. Provide units that are listed and labeled as an assembly by UL or another testing and inspecting agency acceptable to authorities having jurisdiction, appropriate for use in plenum space.
  - 1. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
  - 2. Controls: Remote, three-position control switch installed in recessed device box with flush cover plate matching other electrical device cover plates in room where switch is installed.
    - a. Provide number of control switches indicated for each screen.
    - b. Provide power supply for low-voltage systems if required.
  - 3. Motor in Roller: Instant-reversing motor of size and capacity recommended by screen manufacturer; with permanently lubricated ball bearings, automatic thermal-overload protection, preset limit switches to automatically stop screen in up and down positions, and positive-stop action to prevent coasting. Mount motor inside roller with vibration isolators to reduce noise transmission.
  - 4. Screen Mounting: Top edge securely anchored to rigid metal roller and bottom edge formed into a pocket holding a 3/8-inch-diameter metal rod with ends of rod protected by plastic caps.
    - a. Roller for motor in roller is supported by vibration- and noise-absorbing supports.

- B. Suspended, Electrically Operated Screens without Ceiling Closure, with Motor-in-Roller, and without Tab Tensioning: Units designed and fabricated for suspended mounting, with bottom of case entirely or partially open under screen compartment.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Da-Lite Screen Company; Advantage Electrol (custom fabricated for reverse roll of screen (Fabric Roll B)) or a comparable product by one of the following:
    - a. BEI Audio-Visual Products.
    - b. Draper Inc.
  - 2. Provide metal or metal-lined wiring compartment.
  - 3. Screen Case: Made from metal.
  - 4. Provide screen case constructed to be installed with underside flush with suspended ceiling.
  - 5. Finish on Exposed Surfaces: Baked enamel.

### 2.3 FRONT-PROJECTION SCREEN MATERIAL

- A. Matte-White Viewing Surface: Peak gain of not less than 0.9, and gain of not less than 0.8 at an angle of 50 degrees from the axis of the screen surface.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Da-Lite Screen Company; Matte White or a comparable product by one of the following:
    - a. BEI Audio-Visual Products.
    - b. Bretford, Inc.
    - c. Draper Inc.
- B. Material: Vinyl-coated, glass-fiber fabric.
- C. Mildew-Resistance Rating: Zero or 1 when tested according to ASTM G 21.
- D. Flame Resistance: Passes NFPA 701.
- E. Flame-Spread Index: Not greater than 75 when tested according to ASTM E 84.
- F. Seamless Construction: Provide screens, in sizes indicated, without seams.
- G. Edge Treatment: Without black masking borders.
- H. Size of Viewing Surface: 128W by 72H inches.
- I. Provide extra drop length as follows:
  - 1. Length: 36 inches.
  - 2. Color: Same as viewing surface.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

- A. Install front-projection screens at locations indicated to comply with screen manufacturer's written instructions.
- B. Install front-projection screens with screen cases in position and in relation to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered.
  - 1. Install low-voltage controls according to NFPA 70 and complying with manufacturer's written instructions.
    - a. Wiring Method: Install wiring in raceway except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.
  - 2. Test electrically operated units to verify that screen controls, limit switches, closures, and other operating components are in optimum functioning condition.

#### 3.2 PROTECTION AND CLEANING

- A. Protect projection screens after installation from damage during construction. If damage occurs despite such protection, remove and replace damaged components or entire unit as required to provide units in their original, undamaged condition.

END OF SECTION

## SECTION 12 2413 - ROLLER WINDOW SHADES

### PART 1 - GENERAL

#### 1.1 RELATED DOCUMENTS

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

#### 1.2 SUMMARY

- A. Section Includes:
  - 1. Manually operated roller shades with single rollers.
- B. Related Requirements:
  - 1. Section 09 2116 "Gypsum Board Assemblies."

#### 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 shadecloth materials, their orientation to rollers, and their seam and batten locations.
- C. Samples for Verification: For each type and color of shadecloth material.
  - 1. Include Samples of accessories involving color selection.

#### 1.4 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer.

#### 1.5 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For roller shades to include in maintenance manuals.

#### 1.6 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Obtain roller shades through one source from a single manufacturer with a minimum of twenty years experience in manufacturing products comparable to those specified in this Section.
- B. Installer Qualifications: Installer trained and certified by the manufacturer with a minimum of ten years experience in installing products comparable to those specified in this Section.
- C. Fire Test Response Characteristics: Passes NFPA 701-99 small and large scale vertical burn.

- D. Anti-Microbial Characteristics: "No Growth" per ASTM G21 results for fungi ATCC9642, ATCC 9644, ATCC9645.
- E. Mockups: Build mockups to verify selections made under Sample submittals, to demonstrate aesthetic effects, and to set quality standards for materials and execution. Mock-ups shall include HSS member or element sized to reflect actual installation, including control wiring.
  - 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.
  - 3. Locate mock-up in window designated by Architect.
  - 4. Do not proceed with remaining Work until mock-up is accepted by Architect.

#### 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.

#### 1.9 WARRANTY

- A. Roller Shade Hardware, Chain and Shadecloths: Manufacturer's standard non-depreciating twenty five year limited warranty.

### PART 2 - PRODUCTS

#### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide products as manufactured by MechoShade Systems, Inc.
  - 1. Manually Operated: Mecho 5®.
  - 2. Additional Manufacturers:
    - a. Draper, Inc.
- B. Requests for substitutions will be considered in accordance with the provisions of Section 01 2500 "Substitution Procedures."

## 2.2 SHADES WITH SINGLE ROLLERS

- A. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
  - 1. Roller Drive-End Location: Right side of inside face of shade.
  - 2. Direction of Shadeband Roll: Regular, from back of roller.
  - 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.
- B. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.
- C. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers that are operated by one roller drive-end assembly.
- D. Shadebands:
  - 1. General: Shadeband material shall comply with NFPA 701 for flame-resistance. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
  - 2. Shadeband Material: Vinyl coated polyester.
    - a. Color and Finish: TBD.
    - b. Openness Factor: TBD.
  - 3. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.
    - a. Type: Straight fabric hem pocked with RF-welded seams (Including welded ends).
  - 4. Trim: As indicated by manufacturer's designation for style and color.
  - 5. Orientation on Shadeband: Up the bolt.
- E. Installation Accessories:
  - 1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
    - a. Shape: L-shaped.
    - b. Height: Manufacturer's standard height required to conceal roller and shadeband when shade is fully open, but not less than 3 inches.
  - 2. Endcap Covers: To cover exposed endcaps.
  - 3. 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.
  - 4. Installation Accessories Color and Finish: As selected from manufacturer's full range.

## 2.3 ROLLER-SHADE FABRICATION

- A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1, including requirements for 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:
  - 1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch per side or 1/2-inch total, plus or minus 1/8 inch. Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch, plus or minus 1/8 inch.
- C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible except as follows:
  - 1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:5, provide battens manufacturer's standard guide cables with hem bar to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.

## 2.4 MANUALLY OPERATED 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. Bead Chains: Stainless steel.
    - a. Loop Length: Full length of roller shade.
    - b. Limit Stops: Provide upper and lower ball stops.
    - c. Chain-Retainer Type: Clip, jamb mount.
- B. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.
  - 1. Roller Drive-End Location: Right side of inside face of shade.
  - 2. Direction of Shadeband Roll: Regular, from back of roller.
  - 3. Shadeband-to-Roller Attachment: Manufacturer's standard method.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, operational clearances, 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.

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 after installation, according to manufacturer's written instructions.
- B. 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.
- C. 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 roller shades. Refer to Section 01 7900 "Demonstration and Training."

END OF SECTION



SECTION 12 3216 - MANUFACTURED PLASTIC-LAMINATE-CLAD CASEWORK

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

- A. This Section includes the following:
  - 1. Modular (premanufactured) casework.
  - 2. Solid-surfacing countertops.

1.3 SCOPE OF WORK

- A. Provide all plastic laminate casework and accessory items as specified herein. Refer to plans for specific details and requirements.
  - 1. TMI Systems catalog numbers are shown on Drawings for premanufactured casework.
- B. Utility service outlet accessory fittings, electrical receptacles and switches are furnished and delivered by educational casework subcontractor, for installation under Division 26.
  - 1. Refer to Drawings for locations and types of services required.

1.4 QUALITY ASSURANCE

- A. Single Source Responsibility: Provide educational casework with tops, sinks, and service fittings, manufactured or furnished by same educational casework company for single responsibility.
- B. Catalog Standards: Manufacturer's catalog numbers are shown on drawings for convenience in identifying certain educational casework. Unless modified by notation on drawings or otherwise specified, catalog description for indicated number constitutes requirements for each such cabinet.
  - 1. The use of catalog numbers and specific requirements set forth in drawings and specifications is not intended to preclude the use of any other acceptable manufacturer's product or procedures which may be equivalent, but are given for purpose of establishing standard of design and quality for materials, construction, and workmanship.
- C. Casework manufacturers requesting approval shall submit Division 01 "Request for Substitution Form" in accordance with Division 01 Section "Substitution Procedures," listing any and all deviations to the specification. As a means for evaluation, Casework manufacturers shall submit a **full scale base sample cabinet** for approval not less than ten days prior to Bid date. The sample shall be typical of the casework manufacturer's standard production casework. The sample may be impounded by the Owner and retained until completion of the casework installation. Casework manufacturers seeking approval to Bid shall submit evidence that the

casework manufacturer has adequate plant, equipment, and manpower to produce the quality of casework specified and deliver on schedule.

- D. Experience: Manufacturers shall submit evidence of at least ten years of experience in the manufacturing of casework for specialty areas shown on Drawings and required for this Project.
- E. Past installations: The manufacturer shall submit a list of projects to the Architect which includes similar casework installed for a minimum of three years.
- F. Preinstallation Conference: Conduct conference at Project site to comply with requirements of Division 01 Section "Project Meetings."

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver educational casework only after building is secure and dry.
- B. Store completed educational casework in a ventilated place, protected from the weather, with relative humidity of 60 percent or less at 75 deg F.
- C. Protect finished surfaces from soiling and damage during handling and installation. Keep covered with polyethylene film or other protective covering.

#### 1.6 SUBMITTALS

- A. Product Data: For each type of educational casework unit specified.
- B. Shop Drawings: For educational casework showing plan layout, elevations, ends, cross-sections, service run spaces, and location.
  - 1. Include details and location of anchorages and fitting to floors, walls, and base, including required blocking or back-blocking.
  - 2. Include layout of units with relation to surrounding walls, doors, windows, and other building components.
  - 3. Coordinate shop drawings with other work involved.
  - 4. Include manufacturer's recommendations for blocking and securing of educational casework units and fittings.
- C. Samples: For verification purposes of each type of specified finish. Provide in minimum 6-inch by 6-inch sizes. Samples will be reviewed by Architect-Engineer for color, texture, and pattern only. Compliance with other specified requirements is exclusive responsibility of Contractor.
  - 1. **One full-size cabinet sample with drawer and door.**
  - 2. One minimum 6-inch by 6-inch (or 6-inch-long, as applicable) sample of each of the following:
    - a. Plastic laminate (including chemical-resistant laminate).
    - b. Edge banding.
    - c. Cabinet liner.
    - d. Solid-surfacing material.
  - 3. One full-size sample of pull.

- D. Furnish complete touch-up kit for each type and color of educational casework provided. Kit to include touch-up paint and other materials necessary to perform permanent spot repairs to damaged casework finish.

#### 1.7 WARRANTY

- A. The casework manufacturer shall guarantee casework materials and workmanship for five years from the date of Substantial Completion. Defects reported within the guarantee period will be corrected without charge. Accessories such as sinks, fittings, apparatus, countertops, etc., shall be guaranteed for one year from date of Substantial Completion.

### PART 2 - PRODUCTS

#### 2.1 GENERAL

- A. Educational casework shall meet or exceed the requirements for Architectural Woodwork Institute Quality Standards Section 400B and 1600B for custom grade flush overlay constructed casework. Specific requirements set forth within this specification shall take precedence over the AWI Standard.
- B. Catalog numbers shown on the drawings are those of TMI Systems.
- C. Manufacturers: Subject to compliance with requirements, provide educational casework manufactured by one of the following:
  - 1. Creative Cabinets.
  - 2. Form-A-Fab.
  - 3. Meyer and Lundahl Manufacturing Company.
  - \* 4. TMI Design Systems.
  - 5. LSI Corporation of America.

Note: \* Indicates Basis-of-Design manufacturer.

#### 2.2 MATERIALS

- A. High Pressure Plastic Laminate:
  - 1. Plastic laminate shall meet standard of NEMA LD3-1985, and shall be of the following thickness:
    - a. Balancing Sheet: 0.020 inch.
    - b. Horizontal Surfaces: 0.050 inch.
    - c. Vertical Surfaces: 0.028 inch.
    - d. Cabinet Liner: Pressure fused laminate bonded to substrate. Color shall be manufacturer's standard almond, gray or white as selected by Architect.

2. Manufacturers: Products indicated in Drawings are to establish the quality and aesthetic desired for this Project. Other manufacturers listed below are also acceptable, provided that they manufacture products in color and texture to match that which is selected and specified:
    - a. Formica.
    - b. Pionite.
    - c. Nevamar.
    - d. Laminart.
    - e. Wilsonart.
  3. Color Selection: As indicated in Drawings.
- B. Solid-Surfacing Material: Homogeneous solid sheets of filled plastic resin complying with material and performance requirements in ANSI Z124.3, for Type 5 or Type 6, without a precoated finish.
1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Corian; DuPont Polymers.
    - b. Surell; Formica Corporation.
    - c. Fountainhead; International Paper, Decorative Products Div.
    - d. Gibraltar; Wilsonart International.
- C. High Performance Particleboard Core:
1. Particleboard: Medium density 45-50 pound industrial grade particleboard of fir or pine meeting or exceeding ANSI A 208.1-1993, M-3 requirements. Thicknesses used are 1/4-inch, 1/2-inch, 3/4-inch, and 1 inch.
    - a. At plastic-laminate clad countertops with plumbing fixtures, provide moisture resistant MDF cores.
- D. Hardboard: Hardboard shall meet or exceed Commercial Standards CS-251 and Federal Specifications LLL-B-00810. Tempered hardboard 1/4 inch thick, prefinished.
- E. Edging: 3 mm thick ABS. Solid, high impact, purified, color-thru, acid-resistant, ABS edging machine-applied with hot melt adhesives, automatically trimmed and inside/outside length-radiused for uniform appearance, buffed and corner-radiused for consistent design. Use for door/drawer edges and countertops.
1. Doellken Woodtape Colors: Refer to Drawings.
- F. Hardware:
1. Hinges:
    - a. Heavy duty, five knuckle 2-3/4-inch institutional type hinge. Mill ground, hospital tip, tight pin feature with all edges eased. Hinge to be full wrap around type of tempered steel 0.095 inch thick. Each hinge to have minimum nine screws, #7, 5/8 inch FHMS to assure positive door attachment.
    - b. One pair per door to 36 inch height. One and one-half pair over 37 inches in height. Two pairs on doors wider than 24 inches or for doors 73 inches or higher. Hinge to accommodate 13/16-inch thick laminated door, and allow 270 degree swing.
    - c. Finish to be dull chrome for fixed cabinetry.
  2. Pulls: Stainless steel bar pulls, similar to Hafele No. 104.74.061.

3. Drawer Slides:
    - a. Standard Drawers: Self-closing design. Epoxy powder coated to match drawer body color, with positive in-stop, out-stop and out-keeper to maintain drawer in 80 percent open position. Captive nylon rollers, both front and rear. Minimum 100-lb. dynamic load rating. Provide adjuster cam to regulate body side sway.
    - b. File Drawers: Full extension, 3-part progressive opening slide, minimum 100 lb., zinc plated or epoxy coated at manufacturer's option.
    - c. File Drawer Accessory: Knap & Vogt No. 476 follower and track assembly, or Pendaflex rack.
    - d. Paper Storage Drawers: Full extension, 3-part progressive opening slide, minimum 100 lb., zinc plated or epoxy coated at manufacturer's option.
  4. Catches:
    - a. 7 lb. magnetic catch for base and wall cabinets. Provide two 7 lb. pulls at each tall cabinet door. Catch housing to be molded in color to match cabinet interior.
  5. Adjustable Shelf Supports: To be twin pin design with anti tip-up shelf restraints for both 3/4-inch and 1-inch shelves. Design to include keel to retard shelf slide-off, and slot for ability to mechanically attach shelf to clip. Load rating to be minimum of 300 lbs. each support without failure. Cabinet interior sides shall be flush, without shelf system permanent projection.
  6. Locks: To be disc tumbler lock keyed alike and master keyed. Dull chrome finish.
    - a. Hinged doors and drawers National Lock No. M4-7054C.
    - b. Refer to Casework General Notes for location of locks.
  7. Grommet: Provide as shown, minimum 2-1/2-inch diameter to allow electrical wiring to extend through tops. Molded grommets and matching caps with slot for wire passage. Color/Finish: Polished Chrome.
- G. Detailed Requirements for Cabinet Construction:
1. Sub-Base:
    - a. Cabinet Subbase: All fixed under-counter and tall units shall have an individual factory-applied base, separate and continuous (no cabinet body sides-to-floor), 3/4-inch-thick water resistant exterior grade plywood with concealed fastening to cabinet bottom. Ladder-type construction, of front, back and intermediates, to form a secure and level platform to which cabinets attach. Base is nominal 4 inches high unless shown otherwise. **Panel to the floor or separate particle board base is unacceptable.**
    - b. **No levelers are permitted.**
  2. Cabinet Top and Bottom:
    - a. Base and tall cabinet bottoms to be pressure fused laminated particleboard interior side, 3/4-inch-thick with phenolic neutral colored backer sheet on concealed side.
    - b. Solid sub-top to be 3/4 inch. Furnish for all base and tall cabinets. **Stretchers are unacceptable.**
    - c. Wall cabinet bottoms and tops are 3/4-inch-thick.
    - d. Exterior exposed wall cabinet bottoms to be pressure fused laminate both sides. Assembly devices to be concealed on bottom side of wall cabinets.
  3. Cabinet Ends:
    - a. Pressure fused laminated particleboard interior side, 3/4 inch thick with phenolic neutral colored back sheet on concealed side. Holes drilled for adjustable shelves 1-1/4 inch on center.

- b. Exposed exterior cabinet ends to be laminated with plastic laminate.
    - c. Exposed edges to be ABS in color specified in Paragraph 2.2.E above.
  4. Fixed and Adjustable Shelves:
    - a. Pressure fused laminated particleboard two sides. Leading exposed edge of shelves to be edged with 3 mm ABS in color specified in Paragraph 2.2.E above.
    - b. Thickness: 3/4-inch standard shelving to be maximum 29 inches wide. One-inch shelving is required for shelves 30 inches wide and over.
    - c. Thickness of shelves at all widths of open cabinets: 1 inch.
  5. Cabinet Backs:
    - a. Standard cabinet back to be 1/4-inch thick, prefinished hardboard. Wall and tall cabinets are provided with a 1" x 1-3/4" mounting strip used to secure the cabinet to the wall. Exposed back on fixed or moveable cabinets is 3/4 inch particleboard with the exterior surface finished in GP28 laminate as selected.
  6. Door and Drawer Fronts:
    - a. Plastic laminated doors and drawer fronts to be 13/16 inch thick for all hinged and sliding doors. Core material to be 3/4-inch-thick, 47 lb. density particleboard bonded on exterior with high pressure plastic laminate and with heavy gauge balancing sheet on interior face. Drawer fronts and hinged doors are to overlay the cabinet body. Maintain a maximum 1/8-inch reveal between pairs of doors, between door and drawer front, or between multiple drawer fronts within the cabinet.
    - b. Exposed edges to be 3mm thick ABS. Corners to be machine-radiused and buffed to a consistent 3mm radius. Both outer and inner edges of edging to be machine-radiused and buffed for consistent profile.
  7. Drawers:
    - a. Drawer fronts shall be applied to separate drawer body component sub-front. Secure drawer fronts to drawer body sub-front utilizing both glued and mechanical means of attachment.
    - b. Sides and back of drawers to be 1/2-inch thick pressure fused laminated fiberboard; sub-front same, to be 1/2-inch thick.
    - c. Exposed top edge to be 1 mm ABS, in color selected from manufacturer's standards.
    - d. Drawer bottom is particleboard, 1/2-inch thick, laminated with thermally fused melamine, screwed directly to the bottom edges of the drawer box, to provide a rigid platform. **Drawer bottom less than 1/2-inch thick will not be permitted.**
    - e. The same 1/2-inch-thick particleboard and platform construction detail is used for paper storage drawers and also include an angle retaining bar at the rear of each drawer.
    - f. All drawers shall have roller guides as specified.
  8. Vertical and Horizontal Dividers: Tempered hardboard 1/4-inch thick, smooth both faces. Secure in cabinet with molded plastic clips.
  9. ADA-Americans with Disabilities Act Requirements: The following special requirements shall be met, where specifically indicated on architectural plans as "ADA," or by General Note. To be in compliance with Federal Register Volume 56, No. 144, Rules and Regulations:
    - a. Countertop Height: With or without cabinet below, not to exceed a height of 34 inches A.F.F., (Above Finished Floor), at a surface depth of 24 inches.
    - b. Kneespace Clearance: Minimum 27 inches A.F.F., and 30 inches clear span width.
    - c. 12 inch Deep Shelving, Adjustable or Fixed: Not to exceed a range from 9 inches A.F.F. to 54 inches A.F.F.

- d. Sink Cabinet Clearances: In addition to 9a., b. above, upper kneespace frontal depth to be no less than 11 inches, at a point 9 inches A.F.F., and as further described in Volume 56, Section 4.19.
- H. Countertops, Typical:
1. High pressure plastic laminate bonded to 1-inch-thick particleboard core. Underside to be properly balanced with heavy gauge backing sheet. Unless noted otherwise, edges to be 3 mm ABS. Provide continuous tops for counter type cabinets fixed in a line. No joints closer than 24 inches either side of sink cutout. Countertops with sinks shall have post formed tops, fabricated with moisture resistant MDF cores and have all edges of all cutouts sealed with a color-toned, water-resistant sealer.
  2. Quality Standard: Comply with AWS Section 11 requirements for countertops.
  3. Grade: Custom.
- I. Solid-Surfacing-Material Countertops (SS):
1. Quality Standard: Comply with AWI Section 400 requirements for countertops.
  2. Grade: Custom.
  3. Solid-Surfacing-Material Thickness: 1/2 inch.
  4. Colors, Patterns, and Finishes: Refer to Drawings.
  5. Fabricate tops in one piece with shop-applied backsplashes and edges, unless otherwise indicated. Comply with solid-surfacing-material manufacturer's written recommendations for adhesives, sealers, fabrication, and finishing.
  6. Drill holes for fittings in shop.
- J. Workmanship:
1. All exposed exterior cabinet surfaces to be high pressure plastic laminate, colors as specified. Laminate surface/backer to core under controlled conditions, by approved and regulated laminating methods to assure a premium lamination. Natural-setting adhesives that cure through chemical reaction are required. Methods requiring heat are not allowed; "contact" methods of laminating are not allowed.
  2. Cabinet parts shall be accurately machined and bored for premium grade quality joinery construction utilizing automatic machinery to insure consistent sizing of modular components.
  3. End panels shall be doweled to receive bottom and top.
  4. All cases shall be square, plumb and true.
  5. Provide removable back panels and closure panels for plumbing access.

## PART 3 - EXECUTION

### 3.1 COORDINATION

- A. Coordinate work of this Section with related work of other Sections as necessary to obtain proper installation of all items.
- B. Verify site dimensions of cabinet locations in building prior to fabrication.

### 3.2 CASEWORK INSTALLATION

- A. Install plumb, level, true and aligned with no distortions. Shim as required, using concealed shims. Where casework abuts other finished work, scribe and apply filler strips for accurate fit with fasteners concealed where practicable.
- B. Base Cabinets: Set cabinets straight, plumb, and level. Adjust sub-tops within 1/16 inch of a single plane. Fasten each individual cabinet to floor at toe space with fasteners spaced 24 inches on center. Bolt continuous cabinets together. Secure individual cabinets with not less than 2 fasteners into floor where they do not adjoin other cabinets.
  - 1. Where required, assemble units into one integral unit with joints flush, tight, and uniform. Align similar adjoining doors and drawers to a tolerance of 1/16 inch.
- C. Wall Cabinets: Securely fasten to solid supporting material and not to lath or wallboard. Anchor, adjust, and align wall cabinets as specified for base cabinets.
  - 1. Reinforcement of stud walls to support wall mounted cabinets will be accomplished during wall erection by trade involved; however, indicated accurate location and sizing of reinforcement is responsibility of casework installer.
- D. Install hardware uniformly and precisely after final finishing is complete. Set hinges snug and flat in mortises unless otherwise indicated. Turn screws to flat in mortises unless otherwise indicated. Turn screws to flat seat. Adjust and align hardware so that moving parts operate freely and contact points meet accurately. Allow for final field adjustment after installation.
- E. Adjust casework and hardware so that doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

### 3.3 INSTALLATION OF TOPS

- A. Field Jointing: Where practicable, make in same manner as factory jointing using dowels, splines, adhesives, and fasteners recommended by manufacturer. Locate field joints as shown on accepted shop drawings, factory prepared so there is no job site processing of top and edge surfaces.
- B. Fastenings: Use concealed clamping devices for field joints located within 6 inches of front, at back edges, and at intervals not exceeding 24 inches. Tighten in accordance with manufacturer's instructions to exert a constant, heavy clamping pressure at joints.
  - 1. Secure tops to cabinets with "Z" type fasteners or equivalent, using 2 or more fasteners at each front, end, and back.
- C. Abut top and edge surfaces in one true plane, with internal supports placed to prevent any deflection. Provide flush hairline joints in top units using clamping devices.
  - 1. Where necessary to penetrate top with fasteners, countersink heads approximately 1/8 inch and plug hole flush with material equal in chemical resistance, color, hardness, and texture to top surface.
- D. 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.
  - 1. Install countertops with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.

- E. Provide holes and cutouts as required for mechanical and electrical service fittings.
- F. Carefully dress joints smooth, remove any surface scratches, clean and polish entire surface.
- G. Provide scribe moldings for closures at junctures of top, curb, and splash with walls as recommended by manufacturer for materials involved. Use chemical resistant, permanently elastic sealing compound where recommended by manufacturer.
- H. Provide locks at all drawers and doors.

#### 3.4 INSTALLATION OF ACCESSORIES

- A. Install accessories in accordance with approved location drawings and manufacturer's installation recommendations. Turn screws to a flat seat; do not drive. Adjust moving parts to operate freely and smoothly without binding.

#### 3.5 ADJUSTING

- A. Repair or remove and replace defective work, as directed by Architect upon completion of installation.
- B. Adjust doors, drawers, hardware, fixtures and other moving or operating parts to function smoothly.

#### 3.6 CLEANING AND PROTECTION

- A. Repair or remove and replace defective work as directed upon completion of installation.
- B. Clean factory and shop finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as acceptable to Architect.
- C. Protection: Provide 6-mil plastic or other suitable water resistant covering over countertop surfaces. Tape to underside of countertop at minimum of 4 feet on center. Protect installed casework and fittings from damage by work of other trades.

#### 3.7 SCHEDULE AND DETAILS

- A. Refer to Drawings for details, elevations and locations.

END OF SECTION



## SECTION 12 6700 - PEWS AND BENCHES

### 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 bench seating for courtrooms.

#### 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 construction details, material descriptions, dimensions of components, and finishes for seating.
- B. Shop Drawings: For bench seating.
  - 1. Include plans, elevations, sections, details, and attachments to other work.
  - 2. Seating Layout: Show seating layout, aisle widths, aisle-end alignment or stepping, and locations for wheelchair spaces and assisted listening devices.
- C. Samples for Verification: For each type of exposed finish, prepared on Samples of size indicated below:
  - 1. Finished wood (matching bench seating in existing courtrooms).
  - 2. Fabric for upholstering seating (matching bench seating in existing courtrooms).

#### 1.5 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer and manufacturer.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For bench seating to include in maintenance manuals.

1.7 QUALITY ASSURANCE

- A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

1.8 FIELD CONDITIONS

- A. Environmental Limitations: Do not deliver or install benches until building is enclosed and weatherproof, wet work in space is completed and nominally dry, and HVAC system is operating and maintaining temperature and relative humidity at occupancy levels during the remainder of the construction period.
- B. Do not install benches that are wet, moisture damaged, or mold damaged.
  - 1. Indications that materials are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
  - 2. Indications that materials are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

- A. Source Limitations: Obtain each type of bench seating required, including accessories and mounting components, from single source from single manufacturer.

2.2 BENCH SEATING

- A. Description: Fixed bench seating with upholstered seat as indicated on Drawings.
  - 1. Basis-of-Design Product: Subject to compliance with requirements, provide Sauder Manufacturing Co.; Upholstered Seat with Wood Back and Pew End No. 302-3102 without grooves or a comparable product by one of the following:
    - a. Custom Church Interiors.
    - b. Marshall Company, The.
    - c. New Holland Custom Woorwork, Ltd.
    - d. Ratigan-Schottler Manufacturing.

2.3 MATERIALS

- A. Wood Species for Transparent Finish: Northern red oak. Solid wood with no plywood or particleboard.
- B. Fabric: From manufacturer's full range, matching existing courtrooms, with factory applied stain-resistant treatment.
- C. Seat Padding: Manufacturer's standard padding.

## 2.4 FABRICATION, GENERAL

- A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of woodwork indicated for construction, finishes, installation, and other requirements.
  - 1. Grade: Premium.
- 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. Factory fabricate units, including assembly, finishing and hardware application, to maximum extent possible prior to shipment to site. Where required for fitting at site, provide ample allowance for scribing, trimming and fitting of units.
  - 1. Trial fit assemblies at factory 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 reviewed Shop Drawings prior to disassembling for shipment.
  - 2. Notify Architect minimum seven days in advance of dates and times bench seating fabrication will be complete.

## 2.5 SHOP FINISHING

- A. General: Finish benches at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
- B. Shop Priming: Shop apply the prime coat including backpriming, if any, for transparent-finishing per Architectural Woodwork Standards for grade and system and as indicated below.
- C. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing paneling, as applicable to each unit of work.
  - 1. Backpriming: Apply two coats of sealer or primer, compatible with finish coats, to concealed surfaces of paneling.
- D. Transparent Finish:
  - 1. Grade: Premium.
  - 2. Finish: System - 11, catalyzed polyurethane.
  - 3. Staining: Match benches in existing courtrooms.
  - 4. Open Finish for Open-Grain Woods: Do not apply filler to open-grain woods.
  - 5. Sheen: Match benches in existing courtrooms.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine floors, risers, and other adjacent work and conditions, with Installer present, 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

- A. Anchor bench seating to slab per manufacturer's written instructions.
- B. Fasteners to be concealed, countersunk and blind nailing as required for complete installation.

3.3 ADJUSTING AND CLEANING

- A. Repair damage and defects where possible to satisfaction of Architect. Where repairs are not possible to meet Architect's requirements, replace entire bench seating unit.
- B. Clean woodwork and fabric on all exposed surfaces.

END OF SECTION

## SECTION 142100 - ELECTRIC TRACTION 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. Section includes electric traction passenger elevators as identified in Alternate No. 1.
- B. Related Requirements:
  - 1. Section 01 5000 "Temporary Facilities and Controls" for temporary use of elevators for construction purposes.
  - 2. Section 03 3000 "Cast-in-Place Concrete" for setting sleeves, inserts, and anchoring devices in concrete.
  - 3. Section 04 2010 "Reinforced Unit Masonry" for setting sleeves, inserts, and anchoring devices in masonry and for grouting elevator entrance frames installed in masonry walls.
  - 4. Section 05 1200 "Structural Steel Framing" for the following:
    - a. Attachment plates, angle brackets, and other preparation of structural steel for fastening guide-rail brackets.
    - b. Hoist beams.
  - 5. Section 05 5000 "Metal Fabrications" for the following:
    - a. Structural-steel shapes for subsills.
    - b. Pit ladders.
  - 6. Section 09 9100 "Painting" for field painting of hoistway entrance doors and frames.
  - 7. Section 27 1500 "Communications Horizontal Cabling" for telephone service for elevators.
  - 8. Section 28 3111 "Digital, Addressable Fire-Alarm System" Fire-Alarm System" for smoke detectors in elevator lobbies to initiate emergency recall operation and heat detectors in shafts and machine rooms to disconnect power from elevator equipment before sprinkler activation and for connection to elevator controllers.
- C. Work to be Performed by Others: To complete this installation, the following items must be performed or furnished by the General Contractor in accordance with governing codes. The price and installation schedule of the elevator contractor is based on the job site conditions prevailing at the beginning and during installation of the elevator equipment and includes the following:
  - 1. A properly framed and enclosed legal hoistway, including venting as required by the governing code or authority, ready for uninterrupted use by the elevator contractor at an agreed upon date.
  - 2. All electric power for light, tools, hoists, welding, etc., during erection, to be available at an agreed upon date.

3. Suitable machine room with legal access and ventilation, with concrete floor. Temperature in machine room to be maintained between 60°F and 100°F. Relative humidity should not exceed 95% non-condensing. Ventilation to suit elevator contractor's heat release requirements.
4. Adequate rail bracket supports, bracket spacing as required by governing code, from pit floor to underside of overhead slab. Separator beams where required.
5. Dry pit reinforced to sustain normal vertical forces from rails and impact loads from buffer and cylinder.
6. Vertical surfaces of entrance sill supports must be plumb, one above the other, and square with the hoistway. Finished floor and grout, if required, between jambs frames to sill line. A horizontal support (lintel) is to be provided 8'-0" above the top landing to support the door frame assembly.
7. Hoistway walls are to be designed and constructed in accordance with the required fire rating including where penetrated by elevator fixture boxes and to include adequate fastening to hoistway entrance assemblies. One front entrance wall, at the main landing, is not to be constructed until after all elevator material is located in the hoistway. Remaining front entrance walls shall not be constructed until after door frames and sills are in place. If front walls are poured concrete bearing walls, rough openings are to be provided to accept entrance frames and filled in after frames are set. Rough opening size to suit elevator contractor.
8. All cutting, including cutouts to accommodate hall signal fixtures, patching, and painting of walls, floors, or partitions together with finish painting of entrance doors and frames if required.
9. A three (3) phase, three (3) wire electrical feeder system with an equipment grounding conductor terminating in the machine room. Size of the feeders and grounding conductor to suit elevator power characteristics.
10. A fused disconnect switch or circuit breaker for each elevator, per the National Electrical Code with feeder or branch wiring to controller. Size to suit elevator power characteristics.
11. To meet the date upon which the elevators are to be turned over, the permanent three (3) phase feeder system and protective devices must be installed and power available at an agreed upon date.
12. A 125 volt, 15 ampere capacity dedicated branch circuit, single phase power supply with a SPST fused disconnect switch or circuit breaker for each elevator, per the National Electrical Code with feeder wiring to each controller for car lights.
13. Suitable light fixture and convenience outlets in machine room with light switches located within 18 inches of lock jamb side of machine room door. The receptacles shall have ground-fault circuit-interrupter protection.
14. Suitable light fixture and convenience outlet in pit with light switch adjacent to the access door or ladder. The receptacles shall have ground-fault circuit-interrupter protection.
15. All 125 volt, 15 or 20 ampere, single phase receptacles installed in machine rooms and pits and machinery spaces shall have ground-fault circuit-interrupter protection.
  - a. A smoke detector system, located as required, with wiring from the smoke detectors to the machine room for each group of elevators. Each group of elevators requires a set of contact NORMALLY OPEN from the smoke detector at the designated fireman's landing, and one set of contacts NORMALLY OPEN representing all other smoke detectors in the system.
  - b. If sprinklers are installed in the hoistway, machine room or machinery spaces, a means must be provided to disconnect automatically the mainline power supply of the affected elevator prior to the application of water.

16. Smoke detectors shall not be used to activate sprinklers in hoistways, machine rooms or machinery spaces or to disconnect the main line power supply.
17. Guarding and protecting the hoistway during construction. The protection of the hoistway shall include removable solid panels surrounding each hoistway opening at each floor, a minimum of 48 inches high. Hoistway guards to be erected, maintained and removed by others.
18. **TEMPORARY USE OF ELEVATORS:** Should any elevator be required for use before final completion, others shall provide without expense to elevator contractor, if required, temporary car enclosures, requisite guards or other protection for elevator hoistway openings, main line switch with wiring, necessary power, signaling devices, lights in car and elevator operators together with any other special labor or equipment needed to permit this temporary usage.
  - a. The elevator contractor shall be reimbursed for any labor and material which is not part of the permanent elevator installation and which is required to provide temporary elevator service. In addition, the elevator contractor's temporary acceptance form shall be executed before any elevator is placed in temporary service, and the cost of power and operation, maintenance of the equipment and rehabilitation of equipment shall be paid for by others.
  - b. When an elevator is used for temporary service, the completion date may, as a result of the temporary service, be extended by the elevator contractor. The elevator contractor shall provide notice of the extension at the time the elevator is made available for the temporary service.

### 1.3 DEFINITIONS

- A. Definitions in ASME A17.1/CSA B44 apply to work of this Section.

### 1.4 ACTION SUBMITTALS

- A. **Product Data:** Include capacities, sizes, performances, operations, safety features, finishes, and similar information. Include product data for car enclosures, hoistway entrances, and operation, control, and signal systems.
- B. **Shop Drawings:**
  1. Include plans, elevations, sections, and large-scale details indicating service at each landing, control closet layout, coordination with building structure, relationships with other construction, and locations of equipment.
  2. Include large-scale layout of car-control station.
  3. Indicate 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 car, hoistway door and frame, and signal equipment finishes; 3-inch-square Samples of sheet materials; and 4-inch lengths of running trim members.

### 1.5 INFORMATIONAL SUBMITTALS

- A. **Qualification Data:** For Installer.

- B. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and control closet layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.
- C. Sample Warranty: For special warranty.

#### 1.6 CLOSEOUT SUBMITTALS

- A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
  - 1. In addition to items specified in Section 01 7823 "Operation and Maintenance Data," include diagnostic and repair information available to manufacturer's and Installer's maintenance personnel.
- B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
- C. Continuing Maintenance Proposal: Service agreement specified in this Section.

#### 1.7 QUALITY ASSURANCE

- A. Installer Qualifications: Elevator manufacturer or an authorized representative who is trained and approved by manufacturer.

#### 1.8 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle materials, components, and equipment in manufacturer's protective packaging. Store materials, components, and equipment off of ground, under cover, and in a dry location.

#### 1.9 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 locations and dimensions of other work relating to electric traction elevators including pit ladders; sumps and floor drains in pits; entrance subsills; electrical service; and electrical outlets, lights, and switches in hoistways, pits, and machine rooms.

#### 1.10 WARRANTY

- A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, 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.
2. Warranty Period: Two year(s) from date of Substantial Completion.

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

- A. Basis-of-Design Product: Subject to compliance with requirements, provide Schindler; 3300 low-rise MRL or a comparable product by one of the following:
  1. KONE Inc.
  2. Otis Elevator Co.
  3. ThyssenKrupp Elevator.
- B. Source Limitations: Obtain elevators from single manufacturer.
  1. Major elevator components, including driving machines, controllers, signal fixtures, door operators, car frames, cars, and entrances, shall be manufactured by single manufacturer.

### 2.2 PERFORMANCE REQUIREMENTS

- A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.
- B. Accessibility Requirements: Comply with Section 407 in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.
- C. Seismic Performance: Elevator system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and shall comply with elevator safety requirements for seismic risk Zone 2 or greater in ASME A17.1/CSA B44.
  1. The term "withstand" means "the system will remain in place without separation of any parts when subjected to the seismic forces specified and the system will be fully operational after the seismic event."
  2. Affected peak velocity acceleration ( $A_v$ ) for Project's location is as determined by elevator manufacturer.
  3. Elevator Component Importance Factor: 1.0.

### 2.3 ELEVATORS

- A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturer's standard components shall be used, as included in standard elevator systems and as required for complete system.
- B. Elevator Description: Public Elevator:

1. Machine Location: Control closet, as indicated in Drawings.
2. Machine Type: Gearless traction.
3. Rated Load: 2500 lbs.
4. Rated Speed: 150 fpm.
5. Operation System: Standard single cab operating system.
6. Auxiliary Operations:
  - a. Battery-powered lowering.
7. Car Enclosures:
  - a. Inside Width: 78 inches nominal from side wall to side wall.
  - b. Inside Depth: 66 inches nominal from back wall to front wall (return panels).
8. Car Enclosures:
  - a. Size: As indicated on Drawings.
  - b. Front Walls (Return Panels): Satin stainless steel, No. 4 finish.
  - c. Car Fixtures: Satin stainless steel, No. 4 finish.
  - d. Side Wall Panels: Metal laminate with phenolic backer (Alumasteel Aluminum 6277 (419) by Wilsonart).
  - e. Rear Wall Panels: Plastic laminate (Amber Cherry 7919-38 by Wilsonart).
  - f. Reveals: Brushed aluminum.
  - g. Door Faces (Interior): Satin stainless steel, No. 4 finish.
  - h. Door Sills: Aluminum, mill finish.
  - i. Ceiling: Satin stainless steel, No. 4 finish with manufacturer's standard can or perimeter lighting.
  - j. Handrails: 1/2 by 2 inches rectangular satin stainless steel, No. 4 finish, at sides and rear of car.
  - k. Floor prepared to receive carpet (specified in Section 09 6813 "Tile Carpeting" for CPTT-1).
9. Hoistway Entrances:
10. Width: 48 inches.
  - a. Height: 84 inches.
  - b. Type: Single-speed center opening.
  - c. Frames: Enameled steel.
  - d. Doors: Enameled steel.
  - e. Sills: Aluminum, mill finish.
11. Hall Fixtures: Satin stainless steel, No. 4 finish.
12. Additional Requirements:
  - a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from satin stainless steel, No. 4 finish.

## 2.4 TRACTION SYSTEMS

- A. Elevator Machines: Variable-voltage, variable-frequency, ac-type hoisting machines and solid-state power converters.
  1. Provide nonregenerative system.
  2. Provide line filters or chokes to prevent electrical peaks or spikes from feeding back into building power system.
- B. Inserts: Furnish required concrete and masonry inserts and similar anchorage devices for installing guide rails, machinery, and other components of elevator work. Device installation is specified in another Section.

- C. Machine Beams: Provide framing to support elevator hoisting machine and deflector sheaves from the building structure. Comply with Section 05 5000 "Metal Fabrications" for materials and fabrication.
- D. Car Frame and Platform: Bolted- or welded-steel units.
- E. Guides: Roller guides or polymer-coated, nonlubricated sliding guides. Provide guides at top and bottom of car and counterweight frames.

## 2.5 OPERATION SYSTEMS

- A. General: Provide manufacturer's standard microprocessor operation systems as required to provide type of operation indicated.
- B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated:
  - 1. Single-Car Battery-Powered Lowering: If power fails and car is at a floor, it remains at that floor, opens its doors, and shuts down. If car is between floors, it is lowered to the next floor below, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.

## 2.6 DOOR REOPENING DEVICES

- A. Infrared Array: Provide door reopening device with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams shall cause doors to stop and reopen.

## 2.7 HOISTWAY ENTRANCES

- A. Hoistway Entrance Assemblies: Manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile shall accommodate hoistway wall construction.
- B. Fire-Rated Hoistway Entrance Assemblies: Door and frame assemblies shall comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at as close-to-neutral pressure as possible according to NFPA 252 or UL 10B.
  - 1. Fire-Protection Rating: As indicated on CP\* Sheets.
- C. Materials and Fabrication: Manufacturer's standards, but not less than the following:
  - 1. Enameled-Steel Frames: Formed from cold- or hot-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected by Architect from manufacturer's full range.
  - 2. Enameled-Steel Doors: Flush, hollow-metal construction; fabricated from cold-rolled steel sheet. Provide with factory-applied enamel finish; colors as selected by Architect from manufacturer's full range.
  - 3. Sight Guards: Provide sight guards on doors matching door edges.

4. Sills: Extruded metal, with grooved surface, 1/4 inch thick.
5. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M.

## 2.8 SIGNAL EQUIPMENT

- A. General: Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with long-life lamps and acrylic or other permanent, non-yellowing translucent plastic diffusers or LEDs.
- B. Car-Control Stations: Provide manufacturer's standard semirecessed car-control stations. Mount in return panel adjacent to car door unless otherwise indicated.
  1. Mark buttons and switches for required use or function. 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.
- C. Emergency Communication System: Two-way voice communication system, with visible signal, which dials preprogrammed number of monitoring station and does not require handset use. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.
- D. 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 Section 283111 "Digital, Addressable Fire-Alarm System."
- E. 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. Include travel direction arrows if not provided in car-control station.
- F. Hall Push-Button Stations: Provide one hall push-button station at each landing at each elevator.
  1. Provide units with flat faceplate for mounting with body of unit recessed in wall.
  2. Equip units with buttons for calling elevator and for indicating desired direction of travel.
    - a. Provide for connecting units that require destination registration to building security access system so a card reader can be used to register calls.
- G. 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.
- H. 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 cars.
- I. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction, indicating that in case of fire,

elevators are out of service and exits should be used instead. Provide one sign at each hall push-button station unless otherwise indicated.

## 2.9 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. Hot-Rolled Steel Sheet: ASTM A 1011/A 1011M, commercial steel, Type B, pickled.
- D. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304.
- E. Stainless-Steel Bars: ASTM A 276, Type 304.
- F. Stainless-Steel Tubing: ASTM A 554, Grade MT 304.
- G. Aluminum Extrusions: ASTM B 221, Alloy 6063.
- H. Nickel Silver Extrusions: ASTM B 151/B 151M, Alloy UNS No. C74500 or No. C77600.

## 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 of the Work. 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.
- B. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 INSTALLATION

- A. 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 to minimize vibration transmission to structure and structure-borne noise due to 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, up or down, regardless of load and travel direction.
- 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. Place hall lanterns either above or beside each hoistway entrance.
  - 2. Mount hall lanterns at a minimum of 72 inches above finished floor.

### 3.3 FIELD QUALITY CONTROL

- A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.
- B. Operating Test: Load each elevator 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 that tests are to be performed on elevators.

### 3.4 PROTECTION

- A. Temporary Use: Limit temporary use for construction purposes to one elevator. Comply with the following requirements for each 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, cleanup, and adjustment 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 elevator(s).
- B. Check operation of each elevator with Owner's personnel present before date of Substantial Completion and again not more than one month before end of warranty period. Determine that operation systems and devices are functioning properly.

### 3.6 MAINTENANCE

- A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include 24 months' full maintenance 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. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.
  1. Perform maintenance during normal working hours.
  2. Perform emergency callback service during normal working hours with response time of two hours or less.

END OF SECTION

