

# **Grand Junction Fire Department**

## **Fire Station #3**

**582 25-1/2 Road  
Grand Junction, CO**

PROJECT MANUAL  
Volume 1: Divisions 00 - 20

Architect's Project No. 2072

100% Construction Documents  
FOR CONSTRUCTION

February 25, 2021



Architecture  
Interior Design  
Project Management

622 Rood Avenue  
Grand Junction, CO 81501  
970-242-1058 office

**BLYTHE GROUP + co.**

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**SECTION 01 10 00  
SUMMARY**

**PART 1 GENERAL**

**1.01 PROJECT**

- A. Project Name: Grand Junction Fire Department Fire Station #3 Replacement.
- B. Owner's Name: City of Grand Junction.
- C. Architect's Name: Blythe Group + co.
- D. The Project consists of the construction of a replacement fire station followed by demolition of the existing building, including associated utilities and other sitework on the same parcel of land. The existing facility is to remain in operation during construction of the replacement. After the Owner occupies the replacement and vacates the existing, demolition can begin, followed by final sitework. Fire services must remain in operation throughout.

**1.02 CONTRACT DESCRIPTION**

- A. Contract Type: A single prime contract based on a Stipulated Price as described in Document 00 52 00 - Agreement Form.

**1.03 WORK BY OWNER**

- A. Items noted NIC (Not in Contract) will be supplied and installed by Owner before occupation. Some items include:
  - 1. Movable cabinets.
  - 2. Furnishings.
  - 3. Small equipment.

**1.04 OWNER OCCUPANCY**

- A. Owner intends to occupy the Project upon Substantial Completion.
- B. Cooperate with Owner to minimize conflict and to facilitate Owner's operations.
- C. Schedule the Work to accommodate Owner occupancy.

**1.05 CONTRACTOR USE OF SITE AND PREMISES**

- A. Construction Operations: Limited to areas noted on Drawings.
  - 1. Locate and conduct construction activities in ways that will limit disturbance to site.
- B. Arrange use of site and premises to allow:
  - 1. Owner occupancy.
  - 2. Work by Owner.
- C. Provide access to and from site as required by law and by Owner:
  - 1. Emergency Building Exits During Construction: Keep all exits required by code open during construction period; provide temporary exit signs if exit routes are temporarily altered.
  - 2. Do not obstruct roadways, sidewalks, or other public ways without permit.
- D. Existing building spaces may not be used for storage.
- E. Time Restrictions:
  - 1. Limit conduct of especially noisy exterior work to the hours of 7:00 AM to 7:00 PM, Monday through Friday.
- F. Utility Outages and Shutdown:
  - 1. Do not disrupt or shut down life safety systems, including but not limited to fire sprinklers and fire alarm system, without 7 days notice to Owner and authorities having jurisdiction.
  - 2. Limit shutdown of utility services to eight (8) hours at a time, arranged at least 24 hours in advance with Owner.



3. Prevent accidental disruption of utility services to other facilities.

**END OF SECTION**

**SECTION 01 10 03  
ELECTRONIC DRAWING RELEASE FORM**

**PROJECT: GRAND JUNCTION FIRE DEPARTMENT FIRE STATION #3**

**PROJECT NUMBER: 2072**

**TO:**  
**BLYTHE GROUP + CO.**  
**622 ROOD AVENUE**  
**GRAND JUNCTION, CO 81501**  
**ATTENTION:**

**FROM:**

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

**CONTRACTOR HEREBY REQUESTS ARCHITECT'S ELECTRONIC DRAWING FILES FOR USE IN CONNECTION WITH THE PROJECT IN ACCORDANCE WITH PROVISIONS OF THE CONTRACT DOCUMENTS.**

**THERE IS THE POTENTIAL FOR LIABILITY PROBLEMS WHEN RELEASING ELECTRONIC DRAWING FILES. CONSEQUENTLY, THE ITEMS LISTED BELOW MUST BE AGREED TO PRIOR TO RELEASING THE FILES.**

- A. You agree to hold harmless, indemnify in full, BG+co (Blythe Group + co.), their consultants, agents, employees, servants, and assigns, from and against any and all liability, claims and demands arising out of the use of electronic files provided. This indemnification and hold harmless agreement includes, but is not limited to, any claims, directly or indirectly, for damages, demands or other actions including personal injuries, brought by any persons who seek recovery from BG+co (Blythe Group + co.), their consultants, agents, employees, servants and assigns, regarding the use of the electronic files. It is specifically understood and agreed upon by you, that the content of the electronic files provided has been accomplished with input from the Owner. BG+co (Blythe Group + co.), their consultants, agents, employees, servants and assigns, assume no responsibility for any unauthorized changes or alterations to, nor the accuracy of, the electronic files provided.
- B. The electronic files are provided solely as a convenience and benefit of the Owner for whom design services have been performed and shall NOT be considered "Contract Documents", "Construction Documents" or any type of certified document.
- C. The hard copy bid documents, accompanied by a professional's stamp and signature, are the project documents of record and govern over any electronic files.
- D. Further, contractor acknowledges that electronic model files have been prepared for architect's work and not for contractor's use for shop drawings, clash detection, coordination of subcontractor's work or any other means and method, etc., work by the contractor.
- E. The electronic files are Copyrighted material, are to be used only for this project and are to be used only by you and shall be shared only with subcontractors as pertinent to this project. Any and all use of these files for purposes other than directly related to this project is expressly prohibited.
- F. All individual components used to create the model are the sole property of Blythe Group + co. and may not be extracted, exported or otherwise removed from the model file provided.
- G. This electronic information provides design intent information current as of the date of its release. Any use of this information is at the sole risk and liability of the user who is responsible for performing all checking, review and coordination as necessary to ensure the data obtained from the electronic file is accurate, the same data as shown on the record hard copy

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ELECTRONIC DRAWING RELEASE  
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documents, and for updating any information required to reflect any changes in the design not included in this electronic file to accommodate work performed by use of this electronic file(s).

- H. The accuracy of electronic files which have been translated to a different format, whether by others or by the Architect, shall not be guaranteed by Architect or engineer. Conversion of this electronic information from the system and format used by the Architect or Architect's consultants cannot be accomplished without the introduction of inexactitudes, anomalies, omissions and errors. In the event the electronic data furnished is converted, user agrees to assume all risks associated with such conversion.
- I. In the event BG+co (Blythe Group + co.) determines there is extended cost to provide electronic data beyond their contract, Blythe reserves the right to charge the Contractor for copies of electronic media without waiving any of its requirements, conditions or rights to the electronic models or their use.
- J. The files are being requested in

\_\_\_\_\_ AUTOCAD version \_\_\_ 2018 \_\_\_ 2013 \_\_\_ 2010 \_\_\_ 2007.

Drawing sheets requested:

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\_\_\_\_\_ Revit Version \_\_\_ 2021 \_\_\_ 2020 \_\_\_ 2019.

BIM model being requested:

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**I AGREE TO THE TERMS OF THIS LETTER.**

NAME: \_\_\_\_\_ TITLE: \_\_\_\_\_

DATE: \_\_\_\_\_

COMMENTS:

**SECTION 01 20 00  
PRICE AND PAYMENT PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedures for preparation and submittal of applications for progress payments.
- B. Documentation of changes in Contract Sum and Contract Time.
- C. Change procedures.
- D. Procedures for preparation and submittal of application for final payment.

**1.02 RELATED REQUIREMENTS**

- A. Section 00 50 00 - Contracting Forms and Supplements: Forms to be used.
- B. Section 01 78 00 - Closeout Submittals: Project record documents.

**1.03 SCHEDULE OF VALUES**

- A. Use Schedule of Values Form: AIA G703, edition stipulated in the Agreement.
- B. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit draft to Architect for approval.
- C. Forms filled out by hand will not be accepted.
- D. Revise schedule to list approved Change Orders, with each Application For Payment.

**1.04 APPLICATIONS FOR PROGRESS PAYMENTS**

- A. Payment Period: Submit at intervals stipulated in the Agreement.
- B. Use Form AIA G702 and Form AIA G703, edition stipulated in the Agreement.
- C. Electronic media printout including equivalent information will be considered in lieu of standard form specified; submit sample to Architect for approval.
- D. Forms filled out by hand will not be accepted.
- E. For each item, provide a column for listing each of the following:
  - 1. Item Number.
  - 2. Description of work.
  - 3. Scheduled Values.
  - 4. Previous Applications.
  - 5. Work in Place and Stored Materials under this Application.
  - 6. Total Completed and Stored to Date of Application.
  - 7. Percentage of Completion.
  - 8. Balance to Finish.
  - 9. Retainage.
- F. Execute certification by signature of authorized officer.
- G. Use data from approved Schedule of Values. Provide dollar value in each column for each line item for portion of work performed and for stored products.
- H. List each authorized Change Order as a separate line item, listing Change Order number and dollar amount as for an original item of work.
- I. Submit electronically for each Application for Payment.
- J. Include the following with the application:
  - 1. Transmittal letter as specified for submittals in Section 01 30 00.
  - 2. Construction progress schedule, revised and current as specified in Section 01 30 00.
  - 3. Partial release of liens from major subcontractors and vendors.

- K. When Architect requires substantiating information, submit data justifying dollar amounts in question.

#### **1.05 MODIFICATION PROCEDURES**

- A. For minor changes not involving an adjustment to the Contract Sum or Contract Time, Architect will issue instructions directly to Contractor.
- B. For other required changes, Architect will issue a document signed by Owner instructing Contractor to proceed with the change, for subsequent inclusion in a Change Order.
  - 1. The document will describe the required changes and will designate method of determining any change in Contract Sum or Contract Time.
  - 2. Promptly execute the change.
- C. For changes for which advance pricing is desired, Architect will issue a document that includes a detailed description of a proposed change with supplementary or revised drawings and specifications, a change in Contract Time for executing the change . Contractor shall prepare and submit a fixed price quotation within ten (10) calendar days.
- D. Contractor may propose a change by submitting a request for change to Architect, describing the proposed change and its full effect on the work, with a statement describing the reason for the change, and the effect on the Contract Sum and Contract Time with full documentation.
- E. Computation of Change in Contract Amount: As specified in the Agreement and Conditions of the Contract.
- F. Execution of Change Orders: Architect will issue Change Orders for signatures of parties as provided in the Conditions of the Contract.
- G. After execution of Change Order, promptly revise Schedule of Values and Application for Payment forms to record each authorized Change Order as a separate line item and adjust the Contract Sum.
- H. Promptly revise progress schedules to reflect any change in Contract Time, revise sub-schedules to adjust times for other items of work affected by the change, and resubmit.
- I. Promptly enter changes in Project Record Documents.

#### **1.06 APPLICATION FOR FINAL PAYMENT**

- A. Prepare Application for Final Payment as specified for progress payments, identifying total adjusted Contract Sum, previous payments, and sum remaining due.
- B. Application for Final Payment will not be considered until the following have been accomplished:
  - 1. All closeout procedures specified in Section 01 70 00.

**END OF SECTION**

**SECTION 01 23 00  
ALTERNATES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Description of Alternates.

**1.02 ACCEPTANCE OF ALTERNATES**

- A. Alternates quoted on Bid Forms will be reviewed and accepted or rejected at Owner's option. Accepted Alternates will be identified in the Owner-Contractor Agreement.
- B. Coordinate related work and modify surrounding work to integrate the Work of each Alternate.

**1.03 SCHEDULE OF ALTERNATES**

- A. Alternate No. 1 - Pile Foundation:
  - 1. Base Bid Item: Section 31 62 23 - Concrete Filled Steel Piles and Drawing sheet S2-1 including concrete filled steel pipe piles to support pile caps and grade beams.
  - 2. Alternate Item: Section 31 66 15 - Helical Foundation Piles and Drawing sheet S2-1 including helical piles to support pile caps and grade beams.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

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**SECTION 01 25 00  
SUBSTITUTION PROCEDURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Procedural requirements for proposed substitutions.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 25 01 - Substitution Request Form: Required form for substitution requests made before or after award of contract.
- B. Section 01 30 00 - Administrative Requirements: Submittal procedures, coordination.
- C. Section 01 60 00 - Product Requirements: Fundamental product requirements, product options, delivery, storage, and handling.

**1.03 DEFINITIONS**

- A. Substitutions: Changes from Contract Documents requirements proposed by Contractor to materials, products, assemblies, and equipment.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 GENERAL REQUIREMENTS**

- A. A Substitution Request for products, assemblies, materials, and equipment constitutes a representation that the submitter:
  - 1. Has investigated proposed product and determined that it meets or exceeds the quality level of the specified product, equipment, assembly, or system.
  - 2. Agrees to provide the same warranty for the substitution as for the specified product.
  - 3. Agrees to coordinate installation and make changes to other work that may be required for the work to be complete, with no additional cost to Owner.
  - 4. Waives claims for additional costs or time extension that may subsequently become apparent.
- B. Document each request with complete data substantiating compliance of proposed substitution with Contract Documents. Burden of proof is on proposer.
  - 1. Note explicitly any non-compliant characteristics.
- C. Content: Include information necessary for tracking the status of each Substitution Request, and information necessary to provide an actionable response.
  - 1. Forms included in the Project Manual are adequate for this purpose, and must be used.
- D. Limit each request to a single proposed substitution item.
  - 1. Submit an electronic document, combining the request form with supporting data into single document.

**3.02 RESOLUTION**

- A. Architect may request additional information and documentation prior to rendering a decision. Provide this data in an expeditious manner.
- B. Architect will notify Contractor in writing of decision to accept or reject request.
  - 1. Architect's decision following review of proposed substitution will be noted on the submitted form.

**3.03 ACCEPTANCE**

- A. Accepted substitutions change the work of the Project. They will be documented and incorporated into work of the project by Change Order, Construction Change Directive, Architectural Supplementary Instructions, or similar instruments provided for in the Conditions of the Contract.



### **3.04 CLOSEOUT ACTIVITIES**

- A. See Section 01 78 00 - Closeout Submittals, for closeout submittals.
- B. Include completed Substitution Request Forms as part of the Project record. Include both approved and rejected Requests.

**END OF SECTION**

**SECTION 01 25 01  
SUBSTITUTION REQUEST FORM**

**PROJECT:** GRAND JUNCTION FIRE DEPARTMENT FIRE STATION #3  
**PROJECT NUMBER:** 2072

**TO** FROM: (CONTRACTOR)  
BLYTHE GROUP + CO. \_\_\_\_\_  
622 ROOD AVENUE \_\_\_\_\_  
GRAND JUNCTION, CO 81501 \_\_\_\_\_

**CONTRACTOR AND SUPPLIER HEREBY REQUEST ACCEPTANCE OF THE FOLLOWING PRODUCT OR SYSTEMS AS A SUBSTITUTION IN ACCORD WITH PROVISIONS OF THE CONTRACT DOCUMENTS.**

**SPECIFIED PRODUCT OR SYSTEM:**  
**SUBSTITUTION REQUEST FOR:**  
\_\_\_\_\_  
-

**SPECIFICATION SECTION NO.** \_\_\_\_\_  
**ARTICLE(S)** \_\_\_\_\_  
**PARAGRAPH(S)** \_\_\_\_\_

**SUPPORTING DATA:**  
**PRODUCT DATA FOR PROPOSED SUBSTITUTION IN ACCORD WITH CONTRACT REQUIREMENTS.**  
**SAMPLE IS ATTACHED** \_\_\_\_\_ **SAMPLE WILL BE SENT IF REQUESTED** \_\_\_\_\_

**QUALITY COMPARISON:**

<b>SPECIFIED PRODUCT</b>	<b>PROPOSED SUBSTITUTION</b>
<b>NAME, BRAND:</b> _____	_____
<b>CATALOG NO.:</b> _____	_____
<b>MANUFACTURER:</b> _____	_____
<b>VARIATIONS:</b> _____	_____
<b>MAINTENANCE SERVICE AVAILABLE: YES</b> ____ <b>NO</b> ____	
<b>WHERE?</b> _____	
<b>SPARE PARTS SOURCE:</b> _____	

**PREVIOUS INSTALLATIONS**  
**ATTACH LIST OF MINIMUM OF 5 PREVIOUS INSTALLATIONS GIVING FOLLOWING DATA REGARDING PROJECTS ON WHICH PROPOSED SUBSTITUTION WAS USED:**

**PROJECT 1:** \_\_\_\_\_  
**ADDRESS:** \_\_\_\_\_  
**ARCHITECT/TEL:** \_\_\_\_\_  
\_\_\_\_\_  
**OWNER/TEL:** \_\_\_\_\_  
**DATE INSTALLED:** \_\_\_\_\_  
\_\_\_\_\_  
**DOLLAR VALUE THIS WORK:** \_\_\_\_\_

**PROJECT 2:** \_\_\_\_\_  
**ADDRESS:** \_\_\_\_\_  
\_\_\_\_\_  
**ARCHITECT/TEL:** \_\_\_\_\_  
\_\_\_\_\_  
**OWNER/TEL:** \_\_\_\_\_  
\_\_\_\_\_  
**DATE INSTALLED:** \_\_\_\_\_  
\_\_\_\_\_  
**DOLLAR VALUE THIS WORK:** \_\_\_\_\_

**PROJECT 3:** \_\_\_\_\_  
**ADDRESS:** \_\_\_\_\_  
\_\_\_\_\_  
**ARCHITECT/TEL:** \_\_\_\_\_  
\_\_\_\_\_  
**OWNER/TEL:** \_\_\_\_\_  
\_\_\_\_\_  
**DATE INSTALLED:** \_\_\_\_\_  
\_\_\_\_\_  
**DOLLAR VALUE THIS WORK:** \_\_\_\_\_

**PROJECT 4:** \_\_\_\_\_  
**ADDRESS:** \_\_\_\_\_  
\_\_\_\_\_  
**ARCHITECT/TEL:** \_\_\_\_\_  
**OWNER/TEL:** \_\_\_\_\_  
\_\_\_\_\_  
**DATE INSTALLED:** \_\_\_\_\_  
**DOLLAR VALUE THIS WORK:** \_\_\_\_\_

**PROJECT 5:** \_\_\_\_\_  
**ADDRESS:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

ARCHITECT/TEL: \_\_\_\_\_

OWNER/TEL: \_\_\_\_\_

-

DATE INSTALLED: \_\_\_\_\_

DOLLAR VALUE THIS WORK: \_\_\_\_\_

**REASON FOR NOT GIVING PRIORITY TO SPECIFIED ITEMS:**

**EFFECT OF SUBSTITUTION:**

**PROPOSED SUBSTITUTION AFFECTS OTHER PARTS OF WORK:**

NO \_\_\_ YES \_\_\_ (IF YES, EXPLAIN) \_\_\_\_\_

\_\_\_\_\_  
**SUBSTITUTION CHANGES CONTRACT TIME: NO \_\_\_ YES \_\_\_**

**ADD/DEDUCT \_\_\_\_\_ DAYS**

**SUBSTITUTION REQUIRES DIMENSIONAL REVISION, REDESIGN OF STRUCTURE OR M&E WORK:**

NO \_\_\_ YES \_\_\_ (IF YES, ATTACH COMPLETE DATA.)

**SAVING OR CREDIT TO OWNER, IF ANY, FOR ACCEPTING SUBSTITUTION:**

\$ \_\_\_\_\_.

**EXTRA COST TO OWNER, IF ANY, FOR ACCEPTING SUBSTITUTION:**

\$ \_\_\_\_\_.

**CONTRACTOR'S/SUPPLIER'S STATEMENT OF CONFORMANCE OF PROPOSED SUBSTITUTION TO CONTRACT REQUIREMENTS.**

**I / WE HAVE INVESTIGATED THE PROPOSED SUBSTITUTION.**

**I / WE:**

**BELIEVE THAT IT IS EQUAL OR SUPERIOR IN ALL RESPECTS TO SPECIFIED PRODUCT, EXCEPT AS STATED ABOVE. WILL PROVIDE SAME WARRANTY AS SPECIFIED. HAVE INCLUDED COMPLETE COST DATA AND IMPLICATIONS OF SUBSTITUTION. WILL PAY REDESIGN AND SPECIAL INSPECTION COSTS CAUSED BY USE OF THIS PRODUCT WILL PAY ADDITIONAL COSTS TO OTHER CONTRACTORS CAUSED BY SUBSTITUTION. WILL COORDINATE INCORPORATION OF PROPOSED SUBSTITUTION IN WORK. WILL MODIFY OTHER PARTS OF WORK AS MAY BE NEEDED, TO MAKE ALL PARTS OF WORK COMPLETE AND FUNCTIONING. WAIVE FUTURE CLAIMS FOR ADDED COST TO CONTRACT CAUSED BY SUBSTITUTION.**

**SUPPLIER: \_\_\_\_\_**

**DATE: \_\_\_\_\_**

**BY: \_\_\_\_\_**

**GENERAL CONTRACTOR: \_\_\_\_\_**

**DATE: \_\_\_\_\_**

**BY: \_\_\_\_\_**

**POSITION: \_\_\_\_\_**

Grand Junction Fire Department Fire  
Station #3  
582 25-1/2 Road  
Grand Junction, CO

For Construction  
2/25/21

SUBSTITUTION REQUEST FORM  
01 25 01 - Page 3 of 4  
BG+co Project No. 2072

**COMMENTS:**

Grand Junction Fire Department Fire  
Station #3  
582 25-1/2 Road  
Grand Junction, CO

For Construction  
2/25/21

SUBSTITUTION REQUEST FORM  
01 25 01 - Page 4 of 4  
BG+co Project No. 2072

**SECTION 01 30 00  
ADMINISTRATIVE REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General administrative requirements.
- B. Electronic document submittal service.
- C. Preconstruction meeting.
- D. Progress meetings.
- E. Construction progress schedule.
- F. Coordination drawings.
- G. Submittals for review, information, and project closeout.
- H. Number of copies of submittals.
- I. Requests for Interpretation (RFI) procedures.
- J. Submittal procedures.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 60 00 - Product Requirements: General product requirements.

**1.03 GENERAL ADMINISTRATIVE REQUIREMENTS**

- A. Comply with requirements of Section 01 70 00 - Execution and Closeout Requirements for coordination of execution of administrative tasks with timing of construction activities.
- B. Make the following types of submittals to Architect:
  - 1. Requests for Interpretation (RFI).
  - 2. Requests for substitution.
  - 3. Shop drawings, product data, and samples.
  - 4. Test and inspection reports.
  - 5. Design data.
  - 6. Manufacturer's instructions and field reports.
  - 7. Applications for payment and change order requests.
  - 8. Progress schedules.
  - 9. Coordination drawings.
  - 10. Correction Punch List and Final Correction Punch List for Substantial Completion.
  - 11. Closeout submittals.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 ELECTRONIC DOCUMENT SUBMITTAL**

- A. All documents transmitted for purposes of administration of the contract are to be in electronic (PDF) format, as appropriate to the document, and transmitted via email.
  - 1. Besides submittals for review, information, and closeout, this procedure applies to Requests for Interpretation (RFIs), progress documentation, contract modification documents (e.g. supplementary instructions, change proposals, change orders), applications for payment, field reports and meeting minutes, Contractor's correction punchlist, and any other document any participant wishes to make part of the project record.
  - 2. Contractor and Architect are required to use this process.
  - 3. It is Contractor's responsibility to submit documents in allowable format.
  - 4. Subcontractors, suppliers, and Architect's consultants will be permitted to use the process at no extra charge.

5. Users need an email address, internet access, and PDF review software that includes ability to mark up and apply electronic stamps (such as Adobe Acrobat, www.adobe.com, or Bluebeam PDF Revu, www.bluebeam.com).
  6. Paper document transmittals will not be reviewed.
  7. All other specified submittal and document transmission procedures apply, except that electronic document requirements do not apply to samples or color selection charts.
- B. Project Closeout: Contractor is responsible for compiling archive copies of files for Owner.

### **3.02 PRECONSTRUCTION MEETING**

- A. Owner will schedule a meeting after Notice of Award.
- B. Attendance Required:
1. Owner.
  2. Architect.
  3. Contractor.
- C. Agenda:
1. Execution of Owner-Contractor Agreement.
  2. Submission of executed bonds and insurance certificates.
  3. Distribution of Contract Documents.
  4. Submission of list of subcontractors, schedule of values, and progress schedule.
  5. Designation of personnel representing the parties to Contract, [ ] and Architect.
  6. Procedures and processing of field decisions, submittals, substitutions, applications for payments, proposal request, Change Orders, and Contract closeout procedures.
  7. Scheduling.
- D. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

### **3.03 PROGRESS MEETINGS**

- A. Schedule and administer meetings throughout progress of the work at maximum bi-monthly intervals.
- B. Make arrangements for meetings, prepare agenda with copies for participants, preside at meetings.
- C. Attendance Required:
1. Contractor.
  2. Owner.
  3. Architect.
  4. Contractor's superintendent.
  5. Major subcontractors (as needed).
- D. Agenda:
1. Review minutes of previous meetings.
  2. Review of work progress.
  3. Field observations, problems, and decisions.
  4. Identification of problems that impede, or will impede, planned progress.
  5. Review of submittals schedule and status of submittals.
  6. Review of RFIs log and status of responses.
  7. Maintenance of progress schedule.
  8. Corrective measures to regain projected schedules.
  9. Planned progress during succeeding work period.
  10. Maintenance of quality and work standards.
  11. Effect of proposed changes on progress schedule and coordination.
  12. Other business relating to work.

- E. Record minutes and distribute copies within two days after meeting to participants, with copies to Architect, Owner, participants, and those affected by decisions made.

### **3.04 CONSTRUCTION PROGRESS SCHEDULE**

- A. Within 10 days after date of the Agreement, submit preliminary schedule defining planned operations for the first 60 days of work, with a general outline for remainder of work.
- B. If preliminary schedule requires revision after review, submit revised schedule within 10 days.
- C. Within 20 days after review of preliminary schedule, submit draft of proposed complete schedule for review.
  - 1. Include written certification that major contractors have reviewed and accepted proposed schedule.
- D. Within 10 days after joint review, submit complete schedule.
- E. Submit updated schedule with each Application for Payment.

### **3.05 COORDINATION DRAWINGS**

- A. Review drawings prior to submission to Architect.

### **3.06 REQUESTS FOR INTERPRETATION (RFI)**

- A. Definition: A request seeking one of the following:
  - 1. An interpretation, amplification, or clarification of some requirement of Contract Documents arising from inability to determine from them the exact material, process, or system to be installed; or when the elements of construction are required to occupy the same space (interference); or when an item of work is described differently at more than one place in Contract Documents.
  - 2. A resolution to an issue which has arisen due to field conditions and affects design intent.
- B. Preparation: Prepare an RFI immediately upon discovery of a need for interpretation of Contract Documents. Failure to submit a RFI in a timely manner is not a legitimate cause for claiming additional costs or delays in execution of the work.
  - 1. Prepare a separate RFI for each specific item.
    - a. Review, coordinate, and comment on requests originating with subcontractors and/or materials suppliers.
    - b. Do not forward requests which solely require internal coordination between subcontractors.
  - 2. Prepare in a format and with content acceptable to Owner and Architect.
  - 3. Combine RFI and its attachments into a single electronic file. PDF format is preferred.
- C. Reason for the RFI: Prior to initiation of an RFI, carefully study all Contract Documents to confirm that information sufficient for their interpretation is definitely not included.
  - 1. Unacceptable Uses for RFIs: Do not use RFIs to request the following:
    - a. Approval of submittals (use procedures specified elsewhere in this section).
    - b. Approval of substitutions (see Section - 01 60 00 - Product Requirements)
    - c. Changes that entail change in Contract Time and Contract Sum (comply with provisions of the Conditions of the Contract).
    - d. Different methods of performing work than those indicated in the Contract Drawings and Specifications (comply with provisions of the Conditions of the Contract).
  - 2. Improper RFIs: Requests not prepared in compliance with requirements of this section, and/or missing key information required to render an actionable response. They will be returned without a response, with an explanatory notation.
- D. Content: Include identifiers necessary for tracking the status of each RFI, and information necessary to provide an actionable response.
  - 1. Official Project name and number.
  - 2. Discrete and consecutive RFI number, and descriptive subject/title.
  - 3. Issue date, and requested reply date.



4. Reference to particular Contract Document(s) requiring additional information/interpretation. Identify pertinent drawing and detail number and/or specification section number, title, and paragraph(s).
  5. Annotations: Field dimensions and/or description of conditions which have engendered the request.
  6. Contractor's suggested resolution: A written and/or a graphic solution, to scale, is required in cases where clarification of coordination issues is involved, for example; routing, clearances, and/or specific locations of work shown diagrammatically in Contract Documents. If applicable, state the likely impact of the suggested resolution on Contract Time or the Contract Sum.
- E. Attachments: Include sketches, coordination drawings, descriptions, photos, submittals, and other information necessary to substantiate the reason for the request.
- F. RFI Log: Prepare and maintain a tabular log of RFIs for the duration of the project.
1. Indicate current status of every RFI. Update log promptly and on a regular basis.
  2. Note dates of when each request is made, and when a response is received.
  3. Highlight items requiring priority or expedited response.
  4. Highlight items for which a timely response has not been received to date.
- G. Responses: Content of answered RFIs will not constitute in any manner a directive or authorization to perform extra work or delay the project. If in Contractor's belief it is likely to lead to a change to Contract Sum or Contract Time, promptly issue a notice to this effect, and follow up with an appropriate Change Order request to Owner.
1. Response may include a request for additional information, in which case the original RFI will be deemed as having been answered, and an amended one is to be issued forthwith. Identify the amended RFI with an R suffix to the original number.
  2. Do not extend applicability of a response to specific item to encompass other similar conditions, unless specifically so noted in the response.
  3. Upon receipt of a response, promptly review and distribute it to all affected parties, and update the RFI Log.

### **3.07 SUBMITTAL SCHEDULE**

- A. Submit to Architect for review a schedule for submittals in tabular format.
1. Coordinate with Contractor's construction schedule and schedule of values.
  2. Format schedule to allow tracking of status of submittals throughout duration of construction.
  3. Arrange information to include scheduled date for initial submittal, specification number and title, submittal category (for review or for information), description of item of work covered, and role and name of subcontractor.
  4. Account for time required for preparation, review, manufacturing, fabrication and delivery when establishing submittal delivery and review deadline dates.

### **3.08 SUBMITTALS FOR REVIEW**

- A. When the following are specified in individual sections, submit them for review:
1. Product data.
  2. Shop drawings.
  3. Samples for selection.
  4. Samples for verification.
- B. Submit to Architect for review for the limited purpose of checking for compliance with information given and the design concept expressed in Contract Documents.
- C. Samples will be reviewed for aesthetic, color, or finish selection.
- D. After review, provide copies and distribute in accordance with SUBMITTAL PROCEDURES article below and for record documents purposes described in Section 01 78 00 - Closeout Submittals.

### **3.09 SUBMITTALS FOR INFORMATION**

- A. When the following are specified in individual sections, submit them for information:
  - 1. Design data.
  - 2. Certificates.
  - 3. Test reports.
  - 4. Inspection reports.
  - 5. Manufacturer's instructions.
  - 6. Manufacturer's field reports.
  - 7. Other types indicated.
- B. Submit for Architect's knowledge as contract administrator or for Owner.

### **3.10 SUBMITTALS FOR PROJECT CLOSEOUT**

- A. Submit Correction Punch List for Substantial Completion.
- B. Submit Final Correction Punch List for Substantial Completion.
- C. When the following are specified in individual sections, submit them at project closeout in compliance with requirements of Section 01 78 00 - Closeout Submittals:
  - 1. Project record documents.
  - 2. Operation and maintenance data.
  - 3. Warranties.
  - 4. Bonds.
  - 5. Other types as indicated.
- D. Submit for Owner's benefit during and after project completion.

### **3.11 NUMBER OF COPIES OF SUBMITTALS**

- A. Electronic Documents: Submit one electronic copy in PDF format; an electronically-marked up file will be returned. Create PDFs at native size and right-side up; illegible files will be rejected.
- B. Samples: Submit the number specified in individual specification sections; one of which will be retained by Architect.
  - 1. After review, produce duplicates.
  - 2. Retained samples will not be returned to Contractor unless specifically so stated.

### **3.12 SUBMITTAL PROCEDURES**

- A. General Requirements:
  - 1. Use a separate transmittal for each item.
  - 2. Transmit using approved form.
    - a. Use Contractor's form, subject to prior approval by Architect.
  - 3. Sequentially identify each item. For revised submittals use original number and a sequential numerical suffix.
  - 4. Identify: Project; Contractor; subcontractor or supplier; pertinent drawing and detail number; and specification section number and article/paragraph, as appropriate on each copy.
  - 5. Apply Contractor's stamp, signed or initialed certifying that review, approval, verification of products required, field dimensions, adjacent construction work, and coordination of information is in accordance with the requirements of the work and Contract Documents.
    - a. Submittals from sources other than the Contractor, or without Contractor's stamp will not be acknowledged, reviewed, or returned.
  - 6. Deliver each submittal on date noted in submittal schedule, unless an earlier date has been agreed to by all affected parties, and is of the benefit to the project.
    - a. Send submittals in electronic format via email to Architect.
  - 7. Schedule submittals to expedite the Project, and coordinate submission of related items.
    - a. For each submittal for review, allow 15 days excluding delivery time to and from the Contractor.

- b. For sequential reviews involving Architect's consultants, Owner, or another affected party, allow an additional 7 days.
    - c. For sequential reviews involving approval from authorities having jurisdiction (AHJ), in addition to Architect's approval, allow an additional 30 days.
  - 8. Identify variations from Contract Documents and product or system limitations that may be detrimental to successful performance of the completed work.
  - 9. Provide space for Contractor and Architect review stamps.
  - 10. When revised for resubmission, identify all changes made since previous submission.
  - 11. Distribute reviewed submittals. Instruct parties to promptly report inability to comply with requirements.
  - 12. Incomplete submittals will not be reviewed, unless they are partial submittals for distinct portion(s) of the work, and have received prior approval for their use.
  - 13. Submittals not requested will be recognized, and will be returned "Not Reviewed",
- B. Product Data Procedures:
    - 1. Submit only information required by individual specification sections.
    - 2. Collect required information into a single submittal.
    - 3. Submit concurrently with related shop drawing submittal.
    - 4. Do not submit (Material) Safety Data Sheets for materials or products.
  - C. Shop Drawing Procedures:
    - 1. Prepare accurate, drawn-to-scale, original shop drawing documentation by interpreting Contract Documents and coordinating related work.
    - 2. Do not reproduce Contract Documents to create shop drawings.
    - 3. Generic, non-project-specific information submitted as shop drawings do not meet the requirements for shop drawings.
  - D. Samples Procedures:
    - 1. Transmit related items together as single package.
    - 2. Identify each item to allow review for applicability in relation to shop drawings showing installation locations.
    - 3. Include with transmittal high-resolution image files of samples to facilitate electronic review and approval. Provide separate submittal page for each item image.

### 3.13 SUBMITTAL REVIEW

- A. Submittals for Review: Architect will review each submittal, and approve, or take other appropriate action.
- B. Submittals for Information: Architect will acknowledge receipt and review. See below for actions to be taken.
- C. Architect's actions will be reflected by marking each returned submittal using virtual stamp on electronic submittals.
- D. Architect's and consultants' actions on items submitted for review:
  - 1. Authorizing purchasing, fabrication, delivery, and installation:
    - a. "Approved", or language with same legal meaning.
    - b. "Approved as Noted, Resubmission not required", or language with same legal meaning.
      - 1) At Contractor's option, submit corrected item, with review notations acknowledged and incorporated.
    - c. "Approved as Noted, Resubmit for Record", or language with same legal meaning.
  - 2. Not Authorizing fabrication, delivery, and installation:
- E. Architect's and consultants' actions on items submitted for information:
  - 1. Items for which no action was taken:
    - a. "Received" - to notify the Contractor that the submittal has been received for record only.

2. Items for which action was taken:
  - a. "Reviewed" - no further action is required from Contractor.

**END OF SECTION**

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**SECTION 01 40 00  
QUALITY REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Submittals.
- B. Quality assurance.
- C. Testing and inspection agencies and services.
- D. Contractor's design-related professional design services.
- E. Control of installation.
- F. Mock-ups.
- G. Defect Assessment.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 42 16 - Definitions.

**1.03 CONTRACTOR'S DESIGN-RELATED PROFESSIONAL DESIGN SERVICES**

- A. Coordination: Contractor's professional design services are subject to requirements of project's Conditions for Construction Contract.
- B. Base design on performance and/or design criteria indicated in individual specification sections.
- C. Scope of Contractor's Professional Design Services: Provide for the following items of work:
  - 1. Structural Design of Wood Trusses: As described in Section 06 17 53 - Shop-Fabricated Wood Trusses
  - 2. Sprinkler Layout: Coordinate with ceiling installation, detailed pipe layout, and hydraulic calculations as described in Section 21 13 00 - Fire-Suppression Sprinkler Systems.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Design Data: Submit for Architect's knowledge as contract administrator for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents, or for Owner's information.
- C. Manufacturer's Instructions: When specified in individual specification sections, submit printed instructions for delivery, storage, assembly, installation, start-up, adjusting, and finishing, for the Owner's information. Indicate special procedures, perimeter conditions requiring special attention, and special environmental criteria required for application or installation.
- D. Erection Drawings: Submit drawings for Architect's benefit as contract administrator or for Owner.
  - 1. Submit for information for the limited purpose of assessing compliance with information given and the design concept expressed in the Contract Documents.

**1.05 TESTING AND INSPECTION AGENCIES AND SERVICES**

**PART 3 EXECUTION**

**2.01 CONTROL OF INSTALLATION**

- A. Monitor quality control over suppliers, manufacturers, products, services, site conditions, and workmanship, to produce work of specified quality.
- B. Comply with manufacturers' instructions, including each step in sequence.
- C. Should manufacturers' instructions conflict with Contract Documents, request clarification from Architect before proceeding.

- D. Comply with specified standards as minimum quality for the work except where more stringent tolerances, codes, or specified requirements indicate higher standards or more precise workmanship.
- E. Have work performed by persons qualified to produce required and specified quality.
- F. Verify that field measurements are as indicated on shop drawings or as instructed by the manufacturer.
- G. Secure products in place with positive anchorage devices designed and sized to withstand stresses, vibration, physical distortion, and disfigurement.

## **2.02 MOCK-UPS**

- A. Tests shall be performed under provisions identified in this section and identified in the respective product specification sections.
- B. Assemble and erect specified items with specified attachment and anchorage devices, flashings, seals, and finishes.
- C. Architect will use accepted mock-ups as a comparison standard for the remaining Work.
- D. Where mock-up has been accepted by Architect and is specified in product specification sections to be removed, protect mock-up throughout construction, remove mock-up and clear area when directed to do so by Architect.

## **2.03 TESTING AND INSPECTION**

- A. Testing Agency Duties:
  - 1. Provide qualified personnel at site. Cooperate with Architect and Contractor in performance of services.
  - 2. Perform specified sampling and testing of products in accordance with specified standards.
  - 3. Ascertain compliance of materials and mixes with requirements of Contract Documents.
  - 4. Promptly notify Architect and Contractor of observed irregularities or non-compliance of Work or products.
  - 5. Perform additional tests and inspections required by Architect.
  - 6. Submit reports of all tests/inspections specified.
- B. Limits on Testing/Inspection Agency Authority:
  - 1. Agency may not release, revoke, alter, or enlarge on requirements of Contract Documents.
  - 2. Agency may not approve or accept any portion of the Work.
  - 3. Agency may not assume any duties of Contractor.
  - 4. Agency has no authority to stop the Work.
- C. Contractor Responsibilities:
  - 1. Deliver to agency at designated location, adequate samples of materials proposed to be used that require testing, along with proposed mix designs.
  - 2. Cooperate with laboratory personnel, and provide access to the Work and to manufacturers' facilities.
  - 3. Provide incidental labor and facilities:
    - a. To provide access to Work to be tested/inspected.
    - b. To obtain and handle samples at the site or at source of Products to be tested/inspected.
    - c. To facilitate tests/inspections.
    - d. To provide storage and curing of test samples.
  - 4. Notify Architect and laboratory 24 hours prior to expected time for operations requiring testing/inspection services.
  - 5. Employ services of an independent qualified testing laboratory and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.

- 6. Arrange with Owner's agency and pay for additional samples, tests, and inspections required by Contractor beyond specified requirements.
- D. Re-testing required because of non-compliance with specified requirements shall be performed by the same agency on instructions by Architect.
- E. Re-testing required because of non-compliance with specified requirements shall be paid for by Contractor.

**2.04 DEFECT ASSESSMENT**

- A. Replace Work or portions of the Work not complying with specified requirements.
- B. If, in the opinion of Architect, it is not practical to remove and replace the work, Architect will direct an appropriate remedy or adjust payment.

**END OF SECTION**



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**SECTION 01 42 16  
DEFINITIONS**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. This section supplements the definitions contained in the General Conditions.
- B. Other definitions are included in individual specification sections.

**1.02 DEFINITIONS**

- A. Furnish: To supply, deliver, unload, and inspect for damage.
- B. Install: To unpack, assemble, erect, apply, place, finish, cure, protect, clean, start up, and make ready for use.
- C. Product: Material, machinery, components, equipment, fixtures, and systems forming the work result. Not materials or equipment used for preparation, fabrication, conveying, or erection and not incorporated into the work result. Products may be new, never before used, or re-used materials or equipment.
- D. Provide: To furnish and install.
- E. Supply: Same as Furnish.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

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**SECTION 01 50 00  
TEMPORARY FACILITIES AND CONTROLS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Temporary utilities.
- B. Temporary telecommunications services.
- C. Temporary sanitary facilities.
- D. Temporary Controls: Barriers, enclosures, and fencing.
- E. Security requirements.
- F. Vehicular access and parking.
- G. Waste removal facilities and services.
- H. Project identification sign.
- I. Field offices.

**1.02 TEMPORARY UTILITIES**

- A. Provide and pay for all electrical power, lighting, water, heating and cooling, and ventilation required for construction purposes.
- B. Existing facilities may not be used.
- C. New permanent facilities may not be used.

**1.03 TELECOMMUNICATIONS SERVICES**

- A. Provide, maintain, and pay for telecommunications services to field office at time of project mobilization.
- B. Telecommunications services shall include:
  - 1. Windows-based personal computer dedicated to project telecommunications, with necessary software and laser printer.
  - 2. Internet Connections: Minimum of one; Cable modem or faster.

**1.04 TEMPORARY SANITARY FACILITIES**

- A. Provide and maintain required facilities and enclosures. Provide at time of project mobilization.
- B. Maintain daily in clean and sanitary condition.

**1.05 BARRIERS**

- A. Provide barriers to prevent unauthorized entry to construction areas, to prevent access to areas that could be hazardous to workers or the public, to allow for owner's use of site and to protect existing facilities and adjacent properties from damage from construction operations and demolition.
- B. Provide barricades and covered walkways required by governing authorities for public rights-of-way and for public access to existing building.
- C. Protect non-owned vehicular traffic, stored materials, site, and structures from damage.

**1.06 FENCING**

- A. Construction: Contractor's option.
- B. Provide 6 foot high fence around construction site; equip with vehicular and pedestrian gates with locks.

**1.07 SECURITY**

- A. Provide security and facilities to protect Work, existing facilities, and Owner's operations from unauthorized entry, vandalism, or theft.

**1.08 VEHICULAR ACCESS AND PARKING**

- A. Coordinate access and haul routes with governing authorities and Owner.
- B. Provide and maintain access to fire hydrants, free of obstructions.
- C. Provide means of removing mud from vehicle wheels before entering streets.
- D. Provide temporary parking areas to accommodate construction personnel. When site space is not adequate, provide additional off-site parking.

**1.09 WASTE REMOVAL**

- A. Provide waste removal facilities and services as required to maintain the site in clean and orderly condition.
- B. Provide containers with lids. Remove trash from site periodically.
- C. If materials to be recycled or re-used on the project must be stored on-site, provide suitable non-combustible containers; locate containers holding flammable material outside the structure unless otherwise approved by the authorities having jurisdiction.
- D. Open free-fall chutes are not permitted. Terminate closed chutes into appropriate containers with lids.

**1.10 PROJECT IDENTIFICATION**

- A. Provide project identification sign of design, construction, and location approved by Owner.
- B. No other signs are allowed without Owner permission except those required by law.

**1.11 FIELD OFFICES**

- A. Office: Weathertight, with lighting, electrical outlets, heating, cooling equipment, and equipped with sturdy furniture and drawing display table.
- B. Provide space for Project meetings, with table and chairs to accommodate 6 persons.
- C. Locate offices a minimum distance of 30 feet from existing and new structures.

**1.12 REMOVAL OF UTILITIES, FACILITIES, AND CONTROLS**

- A. Remove temporary utilities, equipment, facilities, materials, prior to Date of Substantial Completion inspection.
- B. Remove underground installations to a minimum depth of 2 feet. Grade site as indicated.
- C. Clean and repair damage caused by installation or use of temporary work.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION - NOT USED**

**END OF SECTION**

**SECTION 01 60 00  
PRODUCT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. General product requirements.
- B. Re-use of existing products.
- C. Transportation, handling, storage and protection.
- D. Product option requirements.
- E. Substitution limitations.
- F. Maintenance materials, including extra materials, spare parts, tools, and software.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 25 00 - Substitution Procedures: Substitutions made during procurement and/or construction phases.

**1.03 SUBMITTALS**

- A. Product Data Submittals: Submit manufacturer's standard published data. Mark each copy to identify applicable products, models, options, and other data. Supplement manufacturers' standard data to provide information specific to this Project.
- B. Shop Drawing Submittals: Prepared specifically for this Project; indicate utility and electrical characteristics, utility connection requirements, and location of utility outlets for service for functional equipment and appliances.
- C. Sample Submittals: Illustrate functional and aesthetic characteristics of the product, with integral parts and attachment devices. Coordinate sample submittals for interfacing work.
  - 1. For selection from standard finishes, submit samples of the full range of the manufacturer's standard colors, textures, and patterns.

**PART 2 PRODUCTS**

**2.01 EXISTING PRODUCTS**

- A. Do not use materials and equipment removed from existing premises unless specifically required or permitted by Contract Documents.
- B. Unforeseen historic items encountered remain the property of the Owner; notify Owner promptly upon discovery; protect, remove, handle, and store as directed by Owner.
- C. Existing materials and equipment indicated to be removed, but not to be re-used, relocated, reinstalled, delivered to the Owner, or otherwise indicated as to remain the property of the Owner, become the property of the Contractor; remove from site.

**2.02 NEW PRODUCTS**

- A. Provide new products unless specifically required or permitted by Contract Documents.
- B. Use of products having any of the following characteristics is not permitted:
- C. Where other criteria are met, Contractor shall give preference to products that:
  - 1. If used on interior, have lower emissions, as defined in Section 01 61 16.
  - 2. If wet-applied, have lower VOC content, as defined in Section 01 61 16.

**2.03 PRODUCT OPTIONS**

- A. Products Specified by Reference Standards or by Description Only: Use any product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Use a product of one of the manufacturers named and meeting specifications, no options or substitutions allowed.

- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

#### **2.04 MAINTENANCE MATERIALS**

- A. Furnish extra materials, spare parts, tools, and software of types and in quantities specified in individual specification sections.
- B. Deliver to Project site; obtain receipt prior to final payment.

### **PART 3 EXECUTION**

#### **3.01 SUBSTITUTION LIMITATIONS**

- A. See Section 01 25 00 - Substitution Procedures.

#### **3.02 TRANSPORTATION AND HANDLING**

- A. Package products for shipment in manner to prevent damage; for equipment, package to avoid loss of factory calibration.
- B. If special precautions are required, attach instructions prominently and legibly on outside of packaging.
- C. Coordinate schedule of product delivery to designated prepared areas in order to minimize site storage time and potential damage to stored materials.
- D. Transport and handle products in accordance with manufacturer's instructions.
- E. Transport materials in covered trucks to prevent contamination of product and littering of surrounding areas.
- F. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.
- G. Provide equipment and personnel to handle products by methods to prevent soiling, disfigurement, or damage, and to minimize handling.
- H. Arrange for the return of packing materials, such as wood pallets, where economically feasible.

#### **3.03 STORAGE AND PROTECTION**

- A. Designate receiving/storage areas for incoming products so that they are delivered according to installation schedule and placed convenient to work area in order to minimize waste due to excessive materials handling and misapplication. See Section 01 74 19.
- B. Store and protect products in accordance with manufacturers' instructions.
- C. Store with seals and labels intact and legible.
- D. Store sensitive products in weathertight, climate-controlled enclosures in an environment favorable to product.
- E. For exterior storage of fabricated products, place on sloped supports above ground.
- F. Protect products from damage or deterioration due to construction operations, weather, precipitation, humidity, temperature, sunlight and ultraviolet light, dirt, dust, and other contaminants.
- G. Comply with manufacturer's warranty conditions, if any.
- H. Cover products subject to deterioration with impervious sheet covering. Provide ventilation to prevent condensation and degradation of products.
- I. Prevent contact with material that may cause corrosion, discoloration, or staining.
- J. Provide equipment and personnel to store products by methods to prevent soiling, disfigurement, or damage.

- K. Arrange storage of products to permit access for inspection. Periodically inspect to verify products are undamaged and are maintained in acceptable condition.

**END OF SECTION**



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**SECTION 01 70 00  
EXECUTION AND CLOSEOUT REQUIREMENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Examination, preparation, and general installation procedures.
- B. Requirements for alterations work, including selective demolition.
- C. Pre-installation meetings.
- D. Cutting and patching.
- E. Surveying for laying out the work.
- F. Cleaning and protection.
- G. Starting of systems and equipment.
- H. Demonstration and instruction of Owner personnel.
- I. Closeout procedures, including Contractor's Correction Punch List, except payment procedures.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 10 00 - Summary: Limitations on working in existing building; continued occupancy; work sequence; identification of salvaged and relocated materials.
- B. Section 01 30 00 - Administrative Requirements: Submittals procedures.
- C. Section 01 79 00 - Demonstration and Training: Demonstration of products and systems to be commissioned and where indicated in specific specification sections
- D. Section 02 41 00 - Demolition: Demolition of whole structures and parts thereof; site utility demolition.

**1.03 QUALIFICATIONS**

- A. For surveying work, employ a land surveyor registered in the State in which the Project is located and acceptable to Architect. Submit evidence of surveyor's Errors and Omissions insurance coverage in the form of an Insurance Certificate. Employ only individual(s) trained and experienced in collecting and recording accurate data relevant to ongoing construction activities,

**1.04 PROJECT CONDITIONS**

- A. Use of explosives is not permitted.
- B. Grade site to drain. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- C. Protect site from puddling or running water. Provide water barriers as required to protect site from soil erosion.
- D. Ventilate enclosed areas to assist cure of materials, to dissipate humidity, and to prevent accumulation of dust, fumes, vapors, or gases.
- E. Dust Control: Execute work by methods to minimize raising dust from construction operations. Provide positive means to prevent air-borne dust from dispersing into atmosphere and over adjacent property.
- F. Erosion and Sediment Control: Plan and execute work by methods to control surface drainage from cuts and fills, from borrow and waste disposal areas. Prevent erosion and sedimentation.
- G. Pollution Control: Provide methods, means, and facilities to prevent contamination of soil, water, and atmosphere from discharge of noxious, toxic substances, and pollutants produced by construction operations. Comply with federal, state, and local regulations.

## **1.05 COORDINATION**

- A. Coordinate scheduling, submittals, and work of the various sections of the Project Manual to ensure efficient and orderly sequence of installation of interdependent construction elements, with provisions for accommodating items installed later.
- B. Notify affected utility companies and comply with their requirements.
- C. Verify that utility requirements and characteristics of new operating equipment are compatible with building utilities. Coordinate work of various sections having interdependent responsibilities for installing, connecting to, and placing in service, such equipment.
- D. Coordinate space requirements, supports, and installation of mechanical and electrical work that are indicated diagrammatically on drawings. Follow routing indicated for pipes, ducts, and conduit, as closely as practicable; place runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for maintenance, and for repairs.
- E. In finished areas except as otherwise indicated, conceal pipes, ducts, and wiring within the construction. Coordinate locations of fixtures and outlets with finish elements.
- F. Coordinate completion and clean-up of work of separate sections.
- G. After Owner occupancy of premises, coordinate access to site for correction of defective work and work not in accordance with Contract Documents, to minimize disruption of Owner's activities.

## **PART 2 PRODUCTS**

### **2.01 PATCHING MATERIALS**

- A. New Materials: As specified in product sections; match existing products and work for patching and extending work.
- B. Type and Quality of Existing Products: Determine by inspecting and testing products where necessary, referring to existing work as a standard.
- C. Product Substitution: For any proposed change in materials, submit request for substitution described in Section 01 60 00 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that existing site conditions and substrate surfaces are acceptable for subsequent work. Start of work means acceptance of existing conditions.
- B. Verify that existing substrate is capable of structural support or attachment of new work being applied or attached.
- C. Examine and verify specific conditions described in individual specification sections.
- D. Take field measurements before confirming product orders or beginning fabrication, to minimize waste due to over-ordering or misfabrication.
- E. Verify that utility services are available, of the correct characteristics, and in the correct locations.
- F. Prior to Cutting: Examine existing conditions prior to commencing work, including elements subject to damage or movement during cutting and patching. After uncovering existing work, assess conditions affecting performance of work. Beginning of cutting or patching means acceptance of existing conditions.

### **3.02 PREPARATION**

- A. Clean substrate surfaces prior to applying next material or substance.
- B. Seal cracks or openings of substrate prior to applying next material or substance.
- C. Apply manufacturer required or recommended substrate primer, sealer, or conditioner prior to applying any new material or substance in contact or bond.

### **3.03 PREINSTALLATION MEETINGS**

- A. When required in individual specification sections, convene a preinstallation meeting at the site prior to commencing work of the section.
- B. Require attendance of parties directly affecting, or affected by, work of the specific section.
- C. Notify Architect four days in advance of meeting date.
- D. Prepare agenda and preside at meeting:
  - 1. Review conditions of examination, preparation and installation procedures.
  - 2. Review coordination with related work.
- E. Record minutes and distribute copies within two days after meeting to participants, with electronic copies to Architect, Owner, participants, and those affected by decisions made.

### **3.04 LAYING OUT THE WORK**

- A. Verify locations of survey control points prior to starting work.
- B. Promptly notify Architect of any discrepancies discovered.
- C. Protect survey control points prior to starting site work; preserve permanent reference points during construction.
- D. Promptly report to Architect the loss or destruction of any reference point or relocation required because of changes in grades or other reasons.
- E. Replace dislocated survey control points based on original survey control. Make no changes without prior written notice to Architect.
- F. Utilize recognized engineering survey practices.
- G. Establish elevations, lines and levels. Locate and lay out by instrumentation and similar appropriate means:
  - 1. Site improvements including pavements; stakes for grading, fill and topsoil placement; utility locations, slopes, and invert elevations.
  - 2. Grid or axis for structures.
  - 3. Building foundation, column locations, ground floor elevations.
- H. Periodically verify layouts by same means.
- I. Maintain a complete and accurate log of control and survey work as it progresses.

### **3.05 GENERAL INSTALLATION REQUIREMENTS**

- A. Install products as specified in individual sections, in accordance with manufacturer's instructions and recommendations, and so as to avoid waste due to necessity for replacement.
- B. Make vertical elements plumb and horizontal elements level, unless otherwise indicated.
- C. Install equipment and fittings plumb and level, neatly aligned with adjacent vertical and horizontal lines, unless otherwise indicated.
- D. Make consistent texture on surfaces, with seamless transitions, unless otherwise indicated.
- E. Make neat transitions between different surfaces, maintaining texture and appearance.

### **3.06 ALTERATIONS**

- A. Drawings showing existing construction and utilities are based on casual field observation and existing record documents only.
  - 1. Verify that construction and utility arrangements are as indicated.
  - 2. Report discrepancies to Architect before disturbing existing installation.
  - 3. Beginning of alterations work constitutes acceptance of existing conditions.
- B. Remove existing work as indicated and as required to accomplish new work.
  - 1. Remove items indicated on drawings.
  - 2. Relocate items indicated on drawings.

3. Where new surface finishes are to be applied to existing work, perform removals, patch, and prepare existing surfaces as required to receive new finish; remove existing finish if necessary for successful application of new finish.
  4. Where new surface finishes are not specified or indicated, patch holes and damaged surfaces to match adjacent finished surfaces as closely as possible.
- C. Services (Including but not limited to HVAC, Plumbing, Fire Protection, Electrical, and Telecommunications): Remove, relocate, and extend existing systems to accommodate new construction.
1. Maintain existing active systems that are to remain in operation; maintain access to equipment and operational components; if necessary, modify installation to allow access or provide access panel.
  2. Where existing systems or equipment are not active and Contract Documents require reactivation, put back into operational condition; repair supply, distribution, and equipment as required.
  3. Where existing active systems serve occupied facilities but are to be replaced with new services, maintain existing systems in service until new systems are complete and ready for service.
    - a. Disable existing systems only to make switchovers and connections; minimize duration of outages.
    - b. Provide temporary connections as required to maintain existing systems in service.
  4. Verify that abandoned services serve only abandoned facilities.
  5. Remove abandoned pipe, ducts, conduits, and equipment, including those above accessible ceilings; remove back to source of supply where possible, otherwise cap stub and tag with identification; patch holes left by removal using materials specified for new construction.
- D. Protect existing work to remain.
1. Prevent movement of structure; provide shoring and bracing if necessary.
  2. Perform cutting to accomplish removals neatly and as specified for cutting new work.
  3. Repair adjacent construction and finishes damaged during removal work.
- E. Adapt existing work to fit new work: Make as neat and smooth transition as possible.
- F. Patching: Where the existing surface is not indicated to be refinished, patch to match the surface finish that existed prior to cutting. Where the surface is indicated to be refinished, patch so that the substrate is ready for the new finish.
- G. Refinish existing surfaces as indicated:
1. Where rooms or spaces are indicated to be refinished, refinish all visible existing surfaces to remain to the specified condition for each material, with a neat transition to adjacent finishes.
  2. If mechanical or electrical work is exposed accidentally during the work, re-cover and refinish to match.
- H. Clean existing systems and equipment.
- I. Remove demolition debris and abandoned items from alterations areas and dispose of off-site; do not burn or bury.
- J. Do not begin new construction in alterations areas before demolition is complete.
- K. Comply with all other applicable requirements of this section.

### **3.07 CUTTING AND PATCHING**

- A. Whenever possible, execute the work by methods that avoid cutting or patching.
- B. See Alterations article above for additional requirements.
- C. Perform whatever cutting and patching is necessary to:
  1. Complete the work.

2. Fit products together to integrate with other work.
  3. Provide openings for penetration of mechanical, electrical, and other services.
  4. Match work that has been cut to adjacent work.
  5. Repair areas adjacent to cuts to required condition.
  6. Repair new work damaged by subsequent work.
  7. Remove samples of installed work for testing when requested.
  8. Remove and replace defective and non-complying work.
- D. Execute work by methods that avoid damage to other work and that will provide appropriate surfaces to receive patching and finishing. In existing work, minimize damage and restore to original condition.
- E. Employ original installer to perform cutting for weather exposed and moisture resistant elements, and sight exposed surfaces.
- F. Cut rigid materials using masonry saw or core drill. Pneumatic tools not allowed without prior approval.
- G. Restore work with new products in accordance with requirements of Contract Documents.
- H. Fit work air tight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.
- I. At penetrations of fire rated walls, partitions, ceiling, or floor construction, completely seal voids with fire rated material , to full thickness of the penetrated element.
- J. Patching:
1. Finish patched surfaces to match finish that existed prior to patching. On continuous surfaces, refinish to nearest intersection or natural break. For an assembly, refinish entire unit.
  2. Match color, texture, and appearance.
  3. Repair patched surfaces that are damaged, lifted, discolored, or showing other imperfections due to patching work. If defects are due to condition of substrate, repair substrate prior to repairing finish.

### **3.08 PROGRESS CLEANING**

- A. Maintain areas free of waste materials, debris, and rubbish. Maintain site in a clean and orderly condition.
- B. Remove debris and rubbish from pipe chases, plenums, attics, crawl spaces, and other closed or remote spaces, prior to enclosing the space.
- C. Broom and vacuum clean interior areas prior to start of surface finishing, and continue cleaning to eliminate dust.
- D. Collect and remove waste materials, debris, and trash/rubbish from site periodically and dispose off-site; do not burn or bury.

### **3.09 PROTECTION OF INSTALLED WORK**

- A. Protect installed work from damage by construction operations.
- B. Provide special protection where specified in individual specification sections.
- C. Provide temporary and removable protection for installed products. Control activity in immediate work area to prevent damage.
- D. Provide protective coverings at walls, projections, jambs, sills, and soffits of openings.
- E. Protect finished floors, stairs, and other surfaces from traffic, dirt, wear, damage, or movement of heavy objects, by protecting with durable sheet materials.
- F. Prohibit traffic or storage upon waterproofed or roofed surfaces. If traffic or activity is necessary, obtain recommendations for protection from waterproofing or roofing material manufacturer.
- G. Remove protective coverings when no longer needed; reuse or recycle coverings if possible.

### **3.10 SYSTEM STARTUP**

- A. Coordinate schedule for start-up of various equipment and systems.
- B. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, and for conditions that may cause damage.
- C. Verify tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
- D. Verify that wiring and support components for equipment are complete and tested.
- E. Execute start-up under supervision of applicable Contractor personnel and manufacturer's representative in accordance with manufacturers' instructions.
- F. Submit a written report that equipment or system has been properly installed and is functioning correctly.

### **3.11 DEMONSTRATION AND INSTRUCTION**

- A. See Section 01 79 00 - Demonstration and Training.

### **3.12 ADJUSTING**

- A. Adjust operating products and equipment to ensure smooth and unhindered operation.

### **3.13 FINAL CLEANING**

- A. Use cleaning materials that are nonhazardous.
- B. Clean interior and exterior glass, surfaces exposed to view; remove temporary labels, stains and foreign substances, polish transparent and glossy surfaces, vacuum carpeted and soft surfaces.
- C. Remove all labels that are not permanent. Do not paint or otherwise cover fire test labels or nameplates on mechanical and electrical equipment.
- D. Clean equipment and fixtures to a sanitary condition with cleaning materials appropriate to the surface and material being cleaned.
- E. Clean filters of operating equipment.
- F. Clean debris from roofs, gutters, downspouts, scuppers, overflow drains, area drains, and drainage systems.
- G. Clean site; sweep paved areas, rake clean landscaped surfaces.
- H. Remove waste, surplus materials, trash/rubbish, and construction facilities from the site; dispose of in legal manner; do not burn or bury.

### **3.14 CLOSEOUT PROCEDURES**

- A. Make submittals that are required by governing or other authorities.
  - 1. Provide copies to Architect.
- B. Conduct preliminary inspection to determine items to be listed for completion or correction in the Contractor's Correction Punch List for Contractor's Notice of Substantial Completion.
- C. Notify Architect when work is considered ready for Architect's Substantial Completion inspection.
- D. Submit written certification containing Contractor's Correction Punch List, that Contract Documents have been reviewed, work has been inspected, and that work is complete in accordance with Contract Documents and ready for Architect's Substantial Completion inspection.
- E. Conduct Substantial Completion inspection and create Final Correction Punch List containing Architect's and Contractor's comprehensive list of items identified to be completed or corrected and submit to Architect.

- F. Correct items of work listed in Final Correction Punch List and comply with requirements for access to Owner-occupied areas.
- G. Notify Architect when work is considered finally complete and ready for Architect's Substantial Completion final inspection.
- H. Complete items of work determined by Architect listed in executed Certificate of Substantial Completion.

**END OF SECTION**



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**SECTION 01 78 00  
CLOSEOUT SUBMITTALS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Project record documents.
- B. Operation and maintenance data.
- C. Warranties and bonds.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 30 00 - Administrative Requirements: Submittals procedures, shop drawings, product data, and samples.
- B. Section 01 70 00 - Execution and Closeout Requirements: Contract closeout procedures.
- C. Individual Product Sections: Specific requirements for operation and maintenance data.
- D. Individual Product Sections: Warranties required for specific products or Work.

**1.03 SUBMITTALS**

- A. Project Record Documents: Submit documents to Architect with claim for final Application for Payment.
- B. Operation and Maintenance Data:
  - 1. Submit electronic (PDF) copy of completed documents 15 days prior to final inspection. This copy will be reviewed and returned after final inspection, with Architect comments. Revise content of all document sets as required prior to final submission.
  - 2. Submit revised final electronic (PDF) documents in final form within 10 days after final inspection.
- C. Warranties and Bonds:
  - 1. Make other submittals within 10 days after Date of Substantial Completion, prior to final Application for Payment.
  - 2. For items of Work for which acceptance is delayed beyond Date of Substantial Completion, submit within 10 days after acceptance, listing the date of acceptance as the beginning of the warranty period.

**PART 2 PRODUCTS - NOT USED**

**PART 3 EXECUTION**

**3.01 PROJECT RECORD DOCUMENTS**

- A. Maintain on site one set of the following record documents; record actual revisions to the Work:
  - 1. Drawings.
  - 2. Specifications.
  - 3. Addenda.
  - 4. Change Orders and other modifications to the Contract.
  - 5. Reviewed shop drawings, product data, and samples.
  - 6. Manufacturer's instruction for assembly, installation, and adjusting.
- B. Ensure entries are complete and accurate, enabling future reference by Owner.
- C. Store record documents separate from documents used for construction.
- D. Record information concurrent with construction progress.
- E. Specifications: Legibly mark and record at each product section description of actual products installed, including the following:
  - 1. Manufacturer's name and product model and number.
  - 2. Product substitutions or alternates utilized.

3. Changes made by Addenda and modifications.
- F. Record Drawings and Shop Drawings: Legibly mark each item to record actual construction including:
  1. Measured horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  2. Measured locations of internal utilities and appurtenances concealed in construction, referenced to visible and accessible features of the Work.
  3. Field changes of dimension and detail.
  4. Details not on original Contract drawings.

### **3.02 OPERATION AND MAINTENANCE DATA**

- A. Source Data: For each product or system, list names, addresses and telephone numbers of Subcontractors and suppliers, including local source of supplies and replacement parts.
- B. Product Data: Mark each sheet to clearly identify specific products and component parts, and data applicable to installation. Delete inapplicable information.
- C. Drawings: Supplement product data to illustrate relations of component parts of equipment and systems, to show control and flow diagrams. Do not use Project Record Documents as maintenance drawings.
- D. Typed Text: As required to supplement product data. Provide logical sequence of instructions for each procedure, incorporating manufacturer's instructions.

### **3.03 OPERATION AND MAINTENANCE DATA FOR MATERIALS AND FINISHES**

- A. For Each Product, Applied Material, and Finish:
- B. Instructions for Care and Maintenance: Manufacturer's recommendations for cleaning agents and methods, precautions against detrimental cleaning agents and methods, and recommended schedule for cleaning and maintenance.
- C. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.

### **3.04 OPERATION AND MAINTENANCE DATA FOR EQUIPMENT AND SYSTEMS**

- A. For Each Item of Equipment and Each System:
  1. Description of unit or system, and component parts.
  2. Identify function, normal operating characteristics, and limiting conditions.
  3. Include performance curves, with engineering data and tests.
  4. Complete nomenclature and model number of replaceable parts.
- B. Where additional instructions are required, beyond the manufacturer's standard printed instructions, have instructions prepared by personnel experienced in the operation and maintenance of the specific products.
- C. Panelboard Circuit Directories: Provide electrical service characteristics, controls, and communications; typed.
- D. Operating Procedures: Include start-up, break-in, and routine normal operating instructions and sequences. Include regulation, control, stopping, shut-down, and emergency instructions. Include summer, winter, and any special operating instructions.
- E. Maintenance Requirements: Include routine procedures and guide for preventative maintenance and trouble shooting; disassembly, repair, and reassembly instructions; and alignment, adjusting, balancing, and checking instructions.
- F. Include manufacturer's printed operation and maintenance instructions.
- G. Include sequence of operation by controls manufacturer.

- H. Provide original manufacturer's parts list, illustrations, assembly drawings, and diagrams required for maintenance.
- I. Provide control diagrams by controls manufacturer as installed.
- J. Provide charts of valve tag numbers, with location and function of each valve, keyed to flow and control diagrams.
- K. Include test and balancing reports.

### **3.05 ASSEMBLY OF OPERATION AND MAINTENANCE MANUALS**

- A. Assemble operation and maintenance data into indexed electronic PDF file(s) for Owner's personnel use, with data arranged in the same sequence as, and identified by, the specification sections.
- B. Where systems involve more than one specification section, provide separate index marker for each system.
- C. Project Directory: Title and address of Project; names, addresses, and telephone numbers of Architect, Consultants, Contractor and subcontractors, with names of responsible parties.
- D. Tables of Contents: List every indexed item, using the same identification as on the divider page before each item. If multiple files are required, include all files Tables of Contents in each file, with the current file clearly identified.
- E. Divider Pages: Provide divider pages in the files for each separate product and system; identify the contents on the divider page; on or immediately following the divider page include a description of product and major component parts of equipment.
- F. Text: Manufacturer's printed data, or typewritten data.
- G. Drawings: Bind electronically in with text; ensure same orientation (all pages right side up).

### **3.06 WARRANTIES AND BONDS**

- A. Obtain warranties and bonds, executed in duplicate by responsible Subcontractors, suppliers, and manufacturers, within 10 days after completion of the applicable item of work. Except for items put into use with Owner's permission, leave date of beginning of time of warranty until Date of Substantial completion is determined.
- B. Verify that documents are in proper form, contain full information, and are notarized.
- C. Co-execute submittals when required.
- D. Retain warranties and bonds until time specified for submittal.
- E. Include scanned images of each in operation and maintenance manuals, indexed separately on Table of Contents.

**END OF SECTION**

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**SECTION 01 79 00  
DEMONSTRATION AND TRAINING**

**PART 1 GENERAL**

**1.01 SUMMARY**

- A. Demonstration of products and systems where indicated in specific specification sections.
- B. Training of Owner personnel in operation and maintenance is required for:
  - 1. All software-operated systems.
  - 2. HVAC systems and equipment.
  - 3. Plumbing equipment.
  - 4. Electrical systems and equipment.
  - 5. Landscape irrigation.
  - 6. Items specified in individual product Sections.

**1.02 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Training Plan: Owner will designate personnel to be trained; tailor training to needs and skill-level of attendees.
  - 1. Submit to Architect for transmittal to Owner.
  - 2. Submit not less than four weeks prior to start of training.
  - 3. Revise and resubmit until acceptable.
  - 4. Provide an overall schedule showing all training sessions.
  - 5. Include at least the following for each training session:
    - a. Identification, date, time, and duration.
    - b. Description of products and/or systems to be covered.
    - c. Name of firm and person conducting training; include qualifications.
    - d. Intended audience, such as job description.
    - e. Objectives of training and suggested methods of ensuring adequate training.
    - f. Methods to be used, such as classroom lecture, live demonstrations, hands-on, etc.
    - g. Media to be used, such as slides, hand-outs, etc.
    - h. Training equipment required, such as projector, projection screen, etc., to be provided by Contractor.
- C. Training Manuals: Provide training manual for each attendee; allow for minimum of two attendees per training session.
  - 1. Include applicable portion of O&M manuals.
  - 2. Include copies of all hand-outs, slides, overheads, video presentations, etc., that are not included in O&M manuals.
  - 3. Provide one extra copy of each training manual to be included with operation and maintenance data.
- D. Video Recordings: Submit digital video recording of each demonstration and training session for Owner's subsequent use.
  - 1. Format: DVD Disc.
  - 2. Label each disc and container with session identification and date.

**1.03 QUALITY ASSURANCE**

- A. Instructor Qualifications: Familiar with design, operation, maintenance and troubleshooting of the relevant products and systems.
  - 1. Provide as instructors the most qualified trainer of those contractors and/or installers who actually supplied and installed the systems and equipment.
  - 2. Where a single person is not familiar with all aspects, provide specialists with necessary qualifications.

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

## **PART 3 EXECUTION**

### **3.01 DEMONSTRATION - GENERAL**

- A. Demonstrations conducted during system start-up do not qualify as demonstrations for the purposes of this section, unless approved in advance by Owner.
- B. Demonstration may be combined with Owner personnel training if applicable.
- C. Operating Equipment and Systems: Demonstrate operation in all modes, including start-up, shut-down, seasonal changeover, emergency conditions, and troubleshooting, and maintenance procedures, including scheduled and preventive maintenance.
  - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.
  - 2. For equipment or systems requiring seasonal operation, perform demonstration for other season within six months.
- D. Non-Operating Products: Demonstrate cleaning, scheduled and preventive maintenance, and repair procedures.
  - 1. Perform demonstrations not less than two weeks prior to Substantial Completion.

### **3.02 TRAINING - GENERAL**

- A. Conduct training on-site unless otherwise indicated.
- B. Owner will provide classroom and seating at no cost to Contractor.
- C. Provide training in minimum two hour segments.
- D. Training schedule will be subject to availability of Owner's personnel to be trained; re-schedule training sessions as required by Owner; once schedule has been approved by Owner failure to conduct sessions according to schedule will be cause for Owner to charge Contractor for personnel "show-up" time.
- E. Review of Facility Policy on Operation and Maintenance Data: During training discuss:
  - 1. The location of the O&M manuals and procedures for use and preservation; backup copies.
  - 2. Typical contents and organization of all manuals, including explanatory information, system narratives, and product specific information.
  - 3. Typical uses of the O&M manuals.
- F. Product- and System-Specific Training:
  - 1. Review the applicable O&M manuals.
  - 2. For systems, provide an overview of system operation, design parameters and constraints, and operational strategies.
  - 3. Review instructions for proper operation in all modes, including start-up, shut-down, seasonal changeover and emergency procedures, and for maintenance, including preventative maintenance.
  - 4. Provide hands-on training on all operational modes possible and preventive maintenance.
  - 5. Emphasize safe and proper operating requirements; discuss relevant health and safety issues and emergency procedures.
  - 6. Discuss common troubleshooting problems and solutions.
  - 7. Discuss any peculiarities of equipment installation or operation.
  - 8. Discuss warranties and guarantees, including procedures necessary to avoid voiding coverage.
  - 9. Review recommended tools and spare parts inventory suggestions of manufacturers.
  - 10. Review spare parts and tools required to be furnished by Contractor.
  - 11. Review spare parts suppliers and sources and procurement procedures.

- G. Be prepared to answer questions raised by training attendees; if unable to answer during training session, provide written response within three days.

**END OF SECTION**



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**SECTION 02 41 00  
DEMOLITION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Selective demolition of built site elements.
- B. Abandonment and removal of existing utilities and utility structures.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 10 00 - Summary: Limitations on Contractor's use of site and premises.
- B. Section 01 50 00 - Temporary Facilities and Controls: Site fences, security, protective barriers, and waste removal.
- C. Section 01 70 00 - Execution and Closeout Requirements: Project conditions; protection of bench marks, survey control points, and existing construction to remain; reinstallation of removed products; temporary bracing and shoring.

**1.03 REFERENCE STANDARDS**

- A. 29 CFR 1926 - U.S. Occupational Safety and Health Standards current edition.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Site Plan: Showing:
  - 1. Vegetation to be protected.
  - 2. Areas for temporary construction and field offices.
  - 3. Areas for temporary and permanent placement of removed materials.
- C. Demolition Plan: Submit demolition plan as specified by OSHA and local authorities.
  - 1. Indicate extent of demolition, removal sequence, bracing and shoring, and location and construction of barricades and fences.
  - 2. Identify demolition firm and submit qualifications.
- D. Project Record Documents: Accurately record actual locations of capped and active utilities and subsurface construction.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Fill Material: As specified in Section 31 20 00 - Earthwork.

**PART 3 EXECUTION**

**3.01 SCOPE**

- A. Remove all paving and curbs as indicated on drawings.
- B. If any are found, remove slabs, foundation walls and footings completely.
- C. Remove concrete slabs on grade as indicated on drawings.
- D. Remove buried utility and building service lines.
- E. Fill excavations, open pits, and holes in ground areas generated as result of removals, using specified fill; compact fill as specified in Section 31 20 00 - Earthwork.

**3.02 GENERAL PROCEDURES AND PROJECT CONDITIONS**

- A. Comply with applicable codes and regulations for demolition operations and safety of adjacent structures and the public.
  - 1. Obtain required permits.
  - 2. Use of explosives is not permitted.

3. Take precautions to prevent catastrophic or uncontrolled collapse of structures to be removed; do not allow worker or public access within range of potential collapse of unstable structures.
  4. Provide, erect, and maintain temporary barriers and security devices.
  5. Conduct operations to minimize effects on and interference with adjacent structures and occupants.
  6. Do not close or obstruct roadways or sidewalks without permit.
  7. Conduct operations to minimize obstruction of public and private entrances and exits; do not obstruct required exits at any time; protect persons using entrances and exits from removal operations.
- B. Do not begin removal until receipt of notification to proceed from Owner.
  - C. Protect existing structures and other elements that are not to be removed.
    1. Provide bracing and shoring.
    2. Prevent movement or settlement of adjacent structures.
    3. Stop work immediately if adjacent structures appear to be in danger.
  - D. Minimize production of dust due to demolition operations; do not use water if that will result in ice, flooding, sedimentation of public waterways or storm sewers, or other pollution.
  - E. If hazardous materials are discovered during removal operations, stop work and notify Architect and Owner; hazardous materials include regulated asbestos containing materials, lead, PCB's, and mercury.

### **3.03 EXISTING UTILITIES**

- A. Coordinate work with utility companies; notify before starting work and comply with their requirements; obtain required permits.
- B. Protect existing utilities to remain from damage.
- C. Do not disrupt public utilities without permit from authority having jurisdiction.
- D. Do not close, shut off, or disrupt existing life safety systems that are in use without at least 7 days prior written notification to Owner.
- E. Do not close, shut off, or disrupt existing utility branches or take-offs that are in use without at least 3 days prior written notification to Owner.
- F. Locate and mark utilities to remain; mark using highly visible tags or flags, with identification of utility type; protect from damage due to subsequent construction, using substantial barricades if necessary.
- G. Remove exposed piping, valves, meters, equipment, supports, and foundations of disconnected and abandoned utilities.
- H. Prepare building demolition areas by disconnecting and capping utilities outside the demolition zone; identify and mark utilities to be subsequently reconnected, in same manner as other utilities to remain.

### **3.04 DEBRIS AND WASTE REMOVAL**

- A. Remove debris, junk, and trash from site.
- B. Leave site in clean condition, ready for subsequent work.
- C. Clean up spillage and wind-blown debris from public and private lands.

**END OF SECTION**

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

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section specifies cast-in place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
  - 1. Footings.
  - 2. Piles and Pile Caps.
  - 3. Foundation Walls and Grade Beams.
  - 4. Slabs-on-grade.
- B. Related Sections include the following:
  - 1. Section 017419 “Construction Waste Management” for recycling and disposal requirements.

## 1.3 DEFINITIONS

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

## 1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
  - 1. Indicate amounts of mixing water to be withheld for later addition at Project site.
  - 2. Submit substantiating data for each concrete mix design contemplated for use to the Architect/Engineer not less than four weeks prior to first concrete placement. Data for each mix shall, as a minimum, include the following:
    - a. Mix identification designation (unique for each mix submitted).
    - b. Statement of intended use for each mix.
    - c. Wet and dry unit weight.

- d. Water/cementitious materials ratio.
  - e. Total air content.
  - f. Design slump.
  - g. Intended method of placement in field.
3. Shrinkage testing per ASTM C157.
- 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. Show all reinforcing, top and bottom profile of concrete element, supports below, and concrete walls, grade beams, joists, etc. framing into the element.
  2. Provide one continuous elevation at 1/4" scale for all beams, joists, or walls in a common line. Show pockets and openings in shear walls, structural slabs, beams, elevation at top of beams, walls, columns, sections through all beams, pilasters and columns, and placing sequence of reinforcing items with more than one reinforcing layer.
  3. Show locations of approved construction joints, splices of reinforcing, type of splice used and splice location, grade of all reinforcement used and specifically identify all ASTM A706 and epoxy coated reinforcing.
- D. Welding certificates if weldable reinforcement is specified on the Contract Documents.
- E. Samples: For vapor retarder.
- F. Qualification Data: For Installer testing agency.
- G. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
1. Alkali-Aggregate Reactivity of Aggregates. Submit test reports indicating that fine and coarse aggregates are not "potentially reactive" based on the ASTM C295 or ASTM C1260 (or ASTM C1293) testing limits set forth in Section 5.1 of "Guide Specification for Concrete Subject to Alkali-Silica Reactions" (2007 Portland Cement Association). Alternately, submit ASTM C1567 test reports indicating that the combination of mix ingredients reduces the expansion due to alkali-aggregate reactivity such that the mix complies with Section 5.2 of "Guide Specification for Concrete Subject to Alkali-Silica Reactions" (2007 Portland Cement Association). All tests for submitted reports shall have been performed within one year of the submittal date.
- H. Material Certificates: For each of the following, signed by manufacturers:
1. Cementitious materials.
  2. Admixtures.
  3. Form materials and form-release agents.
  4. Steel reinforcement and accessories.
  5. Fiber reinforcement.
  6. Curing compounds.
  7. Floor and slab treatments.
  8. Bonding agents.
  9. Adhesives.

10. Vapor retarders.
11. Semirigid joint filler.
12. Joint-filler strips.
13. Repair materials.

- I. Minutes of pre-installation conference.
- J. Placement notification: Advanced notification of concrete placement, submit notification at least 24 hours in advance.
- K. Proposed locations of saw cut joints not indicated on the Contract Documents.
- L. Evaporative retarder product data and application data.

### 1.5 QUALITY ASSURANCE

- A. Installer Qualifications: A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
  1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. Testing Agency Qualifications: An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated, as documented according to ASTM E 548.
  1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-01 or an equivalent certification program.
  2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
  3. Concrete reinforcing steel shall be inspected by personnel experienced in concrete construction and acceptable to the Architect/Engineer. Personnel currently certified as an ACI Concrete Construction Inspector will be accepted.
- D. Source Limitations: Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from one source, and obtain admixtures through one source from a single manufacturer.
- E. Welding: Qualify procedures and personnel according to AWS D1.4, "Structural Welding Code--Reinforcing Steel."

- F. Formwork: Design and engineering of formwork shall be the responsibility of the Contractor. Design of formwork and preparation of formwork drawings shall be under the supervision of a professional engineer registered in the state of the Colorado.
- G. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
1. ACI 301, "Specification for Structural Concrete," Sections 1 through 5.
  2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
- H. Mockups: Cast concrete slab-on-grade panels to demonstrate typical joints, surface finish, texture, tolerances, and standard of workmanship.
1. Build panel approximately 200 sq. ft. for slab-on-grade in the location indicated or, if not indicated, as directed by Architect.
  2. Approved panels may become part of the completed Work if undisturbed at time of Substantial Completion.
- I. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination".
1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
    - a. Contractor's superintendent.
    - b. Independent testing agency responsible for concrete design mixtures.
    - c. Ready-mix concrete manufacturer.
    - d. Concrete subcontractor.
  2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold and hot weather concreting procedures, curing procedures, construction, contraction and isolation joints, joint filler strips, vapor retarder installation, floor and slab flatness and levelness measurement and concrete protection.
  3. Minutes of the meeting shall be recorded, typed, and printed by the Contractor and distributed by the Contractor to all parties concerned within 5 days of the meeting. One copy of the minutes shall also be transmitted to the following for information purposes: Owner's Representative, Consultant Engineer. The minutes shall include a statement by the concrete subcontractor indicating that the proposed mix design, and placing, finishing, and curing procedures can produce the concrete quality required by these specifications.
- J. Record of Work: Maintain a record listing the time and date of placement of all concrete for the structure. Retain batch tickets for all concrete. Such record shall be kept until the completion of the project and shall be available to the Architect for examination at any time.
- K. Pre-placement Inspection: Formwork installation, reinforcing steel placement, and installation of all items to be embedded or cast into concrete shall be verified by the Contractor prior to placement.

## 1.6 DELIVERY, STORAGE, AND HANDLING

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

## PART 2 - PRODUCTS

### 2.1 MANUFACTURERS

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

### 2.2 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
  - 1. Plywood, metal, or other approved panel materials.
  - 2. Exterior grade plywood panels, suitable for concrete forms, complying with DOC PS-1, and as follows:
    - a. High-density overlay, Class 1 or better.
    - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
    - c. Structural 1, B-B or better; mill oiled and edge sealed.
    - d. B-B (Concrete Form)), Class 1 or better; mill oiled and edge sealed.
- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- E. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch (19 by 19 mm), minimum.
- F. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- G. 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.
- H. 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 1-1/2 inch (38 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.

### 2.3 STEEL REINFORCEMENT

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

### 2.4 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel bars, cut bars true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.
- C. Mechanical Splices: Full mechanical splices shall develop at least 125% of the bar yield strength in tension or compression, as required. Splices shall comply with ICC-ES Evaluation Criteria and shall comply with ACI 318 21.2.6.

### 2.5 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project. Alternate cementitious materials, when proposed to control alkali-silica reactions and tested as part of a representative complete concrete mix in accordance with ASTM C1567, may be used subject to approval.

1. Portland Cement: ASTM C 150, Type I/II sulfate resistant, gray white. Supplement with the following:
  - a. Fly Ash: ASTM C 618, Class C or F.
  - b. Ground Granulated Blast-Furnace Slag: ASTM C 989, Grade 100 or 120.
- B. Normal-Weight Aggregates: ASTM C 33, Class 4S coarse aggregate or better, graded. All coarse and fine aggregates shall be tested per ASTM C295 or ASTM C1260 (or ASTM C1293) in accordance with Section 5.1 of "Guide Specification for Concrete Subject to Alkali-Silica Reactions" (2007 Portland Cement Association). Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar applications and service conditions using similar aggregates and cementitious materials.
  1. Maximum Coarse-Aggregate Size: As noted on the drawings.
  2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.
- C. Water: ASTM C 94/C 94M and potable.

## 2.6 ADMIXTURES

- A. Air-Entraining Admixture: ASTM C 260.
- B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.
  1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
  2. Retarding Admixture: ASTM C 494/C 494M, Type B.
  3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
  4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
  5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
  6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.
  7. Non-Chloride, Non-Corrosive Accelerating Admixture: The admixture shall conform to ASTM C494, Type C or E, and shall not contain more chloride ions than are present in municipal drinking water. The admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory (of at least one year's duration) using an acceptable accelerated corrosion test method such as that using electrical potential measures.
  8. Mid-Range water reducing admixture: Shall be EUCON X-15 or EUCON MR by The Euclid Chemical Company, DARACEM or Mira series by W.R. Grace, or POZZOLITH 997 or Rheobuild 3000 by Master Builders, and shall conform to ASTM C494 Type A.
- C. Non-Set-Accelerating Corrosion-Inhibiting Admixture: Commercially formulated, non-set-accelerating, anodic inhibitor or mixed cathodic and anodic inhibitor; capable of forming a protective barrier and minimizing chloride reactions with steel reinforcement in concrete.
  1. Available Products:

- a. Axim Concrete Technologies; Catexol 1000CI.
- b. Boral Material Technologies, Inc.; Boral BCN2.
- c. Cortec Corporation; MCI 2000 .
- d. Grace Construction Products, W. R. Grace & Co.; DCI-S.
- e. Master Builders, Inc.; Rheocrete 222+.
- f. Sika Corporation; FerroGard-901.

## 2.7 VAPOR RETARDERS

- A. Plastic Vapor Retarder: ASTM E 1745, Class B. Include manufacturer's recommended adhesive or pressure-sensitive tape.
  1. Available Products:
    - a. Fortifiber Corporation; Moistop Ultra.
    - b. Raven Industries Inc.; Vapor Block 10.
    - c. Stego Industries, LLC; Stego Wrap, 15 mils.
    - d.
- B. Bituminous Vapor Retarder: 110-mil- (2.8-mm-) thick, semiflexible, 7-ply sheet membrane consisting of reinforced core and carrier sheet with fortified asphalt layers, protective weathercoating, and removable plastic release liner. Furnish manufacturer's accessories including bonding asphalt, pointing mastics, and self-adhering joint tape.
  1. Product: Meadows, W. R., Inc.; Premoulded Membrane Vapor Seal.
  2. Water-Vapor Permeance: 0.00 grains/h x sq. ft. x inches Hg (0.00 ng/Pa x s x sq. m); ASTM E 154.
  3. Tensile Strength: 140 lbf/in. (24.5 kN/m); ASTM E 154.
  4. Puncture Resistance: 90 lbf (400N); ASTM E 154.
- C. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.
- D. Fine-Graded Granular Material: Clean mixture of crushed stone, crushed gravel, and manufactured or natural sand; ASTM D 448, Size 10, with 100 percent passing a 3/8-inch (9.5-mm) sieve, 10 to 30 percent passing a No. 100 (0.15-mm) sieve, and at least 5 percent passing No. 200 (0.075-mm) sieve; complying with deleterious substance limits of ASTM C 33 for fine aggregates.

## 2.8 FLOOR AND SLAB TREATMENTS

- A. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; colorless; that penetrates, hardens, and densifies concrete surfaces.
  1. Available Products:
    - a. Burke by Edoco; Titan Hard.

- b. ChemMasters; Chemisil Plus.
- c. ChemTec International; ChemTec One.
- d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Intraseal.
- e. Curecrete Distribution Inc.; Ashford Formula.
- f. Dayton Superior Corporation; Day-Chem Sure Hard.
- g. Euclid Chemical Company (The); Euco Diamond Hard.
- h. Kaufman Products, Inc.; SureHard.
- i. L&M Construction Chemicals, Inc.; Seal Hard.
- j. Meadows, W. R., Inc.; Liqui-Hard.
- k. Metalcrete Industries; Floorsaver.
- l. Nox-Crete Products Group, Kinsman Corporation; Duranox.
- m. Symons Corporation, a Dayton Superior Company; Buff Hard.
- n. US Mix Products Company; US Spec Industraseal.
- o. Vexcon Chemicals, Inc.; Vexcon StarSeal PS.

## 2.9 CURING MATERIALS

- A. Evaporation Retarder: Waterborne, monomolecular film forming, manufactured for application to fresh concrete.
  - 1. Available Products:
    - a. Axim Concrete Technologies; Cimfilm.
    - b. Burke by Edoco; BurkeFilm.
    - c. ChemMasters; Spray-Film.
    - d. Conspec Marketing & Manufacturing Co., Inc., a Dayton Superior Company; Aquafilm.
    - e. Dayton Superior Corporation; Sure Film.
    - f. Euclid Chemical Company (The); Eucobar.
    - g. Kaufman Products, Inc.; Vapor Aid.
    - h. Lambert Corporation; Lambco Skin.
    - i. L&M Construction Chemicals, Inc.; E-Con.
    - j. MBT Protection and Repair, Div. of ChemRex; Confilm.
    - k. Meadows, W. R., Inc.; Sealtight Evapre.
    - l. Metalcrete Industries; Waterhold.
    - m. Nox-Crete Products Group, Kinsman Corporation; Monofilm.
    - n. Sika Corporation, Inc.; SikaFilm.
    - o. Symons Corporation, a Dayton Superior Company; Finishing Aid.
    - p. Unitex; Pro-Film.
    - q. US Mix Products Company; US Spec Monofilm ER.
    - r. Vexcon Chemicals, Inc.; Certi-Vex EnvioAssist.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. when dry.

- D. Water: Potable.

## 2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: ASTM D 1751, asphalt-saturated cellulosic fiber or ASTM D 1752, cork or self-expanding cork.
- B. Semirigid Joint Filler: Two-component, semirigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059, Type II, non-redispersible, acrylic emulsion or styrene butadiene.
- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
  - 1. Types I and II, non-load bearing , for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Reglets: Fabricate reglets of not less than 0.0217-inch- (0.55-mm-) thick, galvanized steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- F. Dovetail Anchor Slots: Hot-dip galvanized steel sheet, not less than 0.0336 inch (0.85 mm) thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

## 2.11 REPAIR MATERIALS

- A. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch (3.2 mm) and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C 150, Portland Cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
  - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch (3.2 to 6 mm) or coarse sand as recommended by topping manufacturer.
  - 4. Compressive Strength: Not less than 5000 psi (34.5 MPa) at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
  - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
  - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.

3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
4. Compressive Strength: Not less than 4,100 psi at 28 days when tested according to ASTM C 109/C 109M.
5. Provide products compatible with specified flooring materials and adhesives.

## 2.12 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
  1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.
- B. Cementitious Materials: Limit percentage, by weight, of cementitious materials other than Portland Cement in concrete as follows:
  1. Fly Ash: 25 percent.
  2. Combined Fly Ash and Pozzolan: 25 percent.
- C. Limit water-soluble, chloride-ion content in hardened concrete to 0.15 percent by weight of cement.
- D. Admixtures: Use admixtures according to manufacturer's written instructions.
  1. Use water-reducing high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
  2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
  3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
  4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
- E. Performance and Design Requirements
  1. Shrinkage: Shrinkage strain, determined and reported in accordance with ASTM C157 as amended and modified herein, shall not exceed the values below for each class of concrete listed.
    - a. Amendments and Modifications to ASTM C157:
      - 1) Storage: After the initial 24 hour comparator reading, the specimens are placed back in the lime-saturated water until the age of 7 days. At this time another comparator reading is taken. This reading is used as the base reading, which is used to calculate percent shrinkage. The specimens are then stored in a 50% humidity room at 73 degrees.
      - 2) Test Reports: Report gage length (average of 3) after 4, 7, 14, 28, and 56 days. In addition to the information required by ASTM C157 Section 11, shrinkage test reports shall include the gage lengths (initial measurements) used to determine the reported shrinkage strains.
    - b. 28-day Shrinkage Strain: Shrinkage strains, determined as above after 28 days of storage, shall not exceed the following:

- 1) Concrete for slabs-on-grade cast directly on a vapor retarder: 0.046%.

## 2.13 CONCRETE MIXTURES FOR BUILDING ELEMENTS

- A. Proportion structural normal weight concrete mixture as noted on the drawings, unless aggregates are “potentially reactive” with alkalis based on the ASTM C295 or ASTM C1260 (or ASTM C1293) testing limits of Section 5.1 of “Guide Specification for Concrete Subject to Alkali-Silica Reactions” (2007 Portland Cement Association). When aggregates are “potentially reactive”, compliance with Section 5.2 of “Guide Specification for Concrete Subject to Alkali-Silica Reactions” (2007 Portland Cement Association) must be established through ASTM C1567 testing for proposed alternate concrete mixture. Submit test reports in accordance with Part I of this specification.

## 2.14 FABRICATING REINFORCEMENT

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

## 2.15 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116, and furnish batch ticket information.
  1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

## PART 3 - EXECUTION

### 3.1 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117. Concrete adjacent to elevators shall be installed within the tolerances required by the elevator manufacturer.
- C. Limit concrete surface irregularities, designated by ACI 347R as abrupt or gradual, as follows:
  1. Class A, 1/8 inch for smooth-formed finished surfaces.
  2. Class B, 1/4 inch for rough-formed finished surfaces.
  3. The permissible irregularity is a cumulative value due to all sources of error including, but not limited to, layout, plumbness, member sizes, formwork offsets, joints, and member levelness. The permissible irregularity shall also apply between adjacent concrete surfaces on opposite sides of a construction joint, expansion joint, or shrinkage pour strip.

- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
  - 1. Install keyways, reglets, recesses, and the like, for easy removal.
  - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.
- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.
- M. All formwork surfaces that will provide the finished surface of exposed concrete must be accepted by the Architect before depositing concrete.

### 3.2 EMBEDDED ITEMS

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



### 3.3 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete, if concrete is hard enough to not be damaged by form-removal operations and curing and protection operations are maintained.
  - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 70 percent of its 28-day design compressive strength.
  - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

### 3.4 SHORES AND RESHORES

- A. Comply with ACI 318 (ACI 318M) and ACI 301 for design, installation, and removal of shoring and reshoring.
  - 1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and reshore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

### 3.5 VAPOR RETARDERS

- A. Plastic Vapor Retarders: Place, protect, and repair vapor retarders according to ASTM E 1643 and manufacturer's written instructions.
  - 1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.
  - 2. Place plastic vapor retarder as indicated in the drawings.

### 3.6 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not place reinforcement on grade or deck and subsequently raise into position while placing concrete. Do not tack weld crossing reinforcing bars.
  1. Weld reinforcing bars according to AWS D1.4, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- F. Size, length, number, and placing of supports shall be sufficient to hold reinforcing in the proper position within specified tolerances during construction traffic and concrete placement.
- G. On vertical formwork, use approved bar chairs or spacers as required to maintain proper concrete cover and bar position. Do not staple or use any other metallic fastener to secure bolsters, chairs, etc. to formwork for concrete surfaces exposed the exterior.

### 3.7 JOINTS

- A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
  1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
  2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches (38 mm) into concrete.
  3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
  4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
  5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
  6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

- C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
  2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
  3. All other Interior Slabs-on-Grade: Unless noted otherwise on the drawings, locate construction joints on column centerlines. Locate control joints where shown on the drawings. If not shown, provide control joints at column centerlines and at intervals not more than 10 feet each way.
- D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.
  2. Terminate full-width joint-filler strips not less than 1/2 inch (13 mm) or more than 1 inch (25 mm) below finished concrete surface where joint sealants, specified in Division 07 Section "Joint Sealants," are indicated.
  3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.
- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.
- F. Joints in Slabs on Metal Deck: Locate construction joints as noted on the drawings. For metal deck slabs with W.W.F., continue W.W.F. through the construction joint and lap in the adjacent pour. Do not provide control joints.

### 3.8 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Architect.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.

- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
  2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
  3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches (150 mm) into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.
1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
  2. Maintain reinforcement in position on chairs during concrete placement.
  3. Screed slab surfaces with a straightedge and strike off to correct elevations.
  4. Slope surfaces uniformly to drains where required.
  5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
  2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
  3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
  2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

### 3.9 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
  - 1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete as indicated.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:
  - 1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
  - 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part Portland Cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white Portland Cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
  - 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part Portland Cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white Portland Cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces, unless otherwise indicated.

### 3.10 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch (6 mm) in 1 direction.

1. Apply scratch finish to surfaces indicated and to receive concrete floor toppings or to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces indicated and surfaces to receive trowel finish and to be covered with fluid applied or sheet waterproofing, built-up or membrane roofing.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces indicated or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system .
  2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:
    - a. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
    - b. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.
- E. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces indicated or where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
1. Comply with flatness and levelness tolerances for trowel finished floor surfaces.
- F. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, and ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

### 3.11 MISCELLANEOUS CONCRETE ITEMS

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

- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations: Provide machine and equipment bases and foundations as shown on Drawings. Set anchor bolts for machines and equipment at correct elevations, complying with diagrams or templates from manufacturer furnishing machines and equipment.

### 3.12 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h (1 kg/sq. m x h) before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
  - 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch (300-mm) lap over adjacent absorptive covers.
  - 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape. Moisture-retaining cover shall be inspected each day by Contractor. Any areas which do not show condensation on the underside of the cover or any slab areas which are not wet shall be immediately rewetted and the cover reapplied to prevent moisture loss.
    - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
    - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.

- c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project..

3. Curing Compound: Not allowed.
4. Curing and Sealing Compound: Not allowed.

### 3.13 LIQUID FLOOR TREATMENTS

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

### 3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
  1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semirigid joint filler full depth in saw-cut joints and at least 2 inches (50 mm) deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

### 3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part Portland Cement to two and one-half parts fine aggregate passing a No. 16 (1.18-mm) sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning and that are unacceptable to the Architects. Allow Architect/Engineer to observe formed concrete surfaces immediately upon removal of forms and prior to repair of surface defects. Defects in structural concrete shall be brought to the attention of the Architect/Engineer. Repair tie holes and surface defects immediately after such observation. Where the concrete surface will be textured by sandblasting or bush-hammering, repair surfaces before texturing.
  1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch (13 mm) in any dimension in solid concrete, but not less than 1 inch (25 mm) in depth. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching



- mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
  3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template. Submit proposed repair for acceptance prior to beginning this work.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch (0.25 mm) wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
  2. After concrete has cured at least 14 days, correct high areas by grinding.
  3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
  4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
  5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch (6 mm) to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
  6. Repair defective areas, except random cracks and single holes 1 inch (25 mm) or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch (19-mm) clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
  7. Repair random cracks and single holes 1 inch (25 mm) or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Architect's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Architect's approval.

## 3.16 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
  - 1. Steel reinforcement placement.
  - 2. Steel reinforcement welding.
  - 3. Headed bolts and studs.
  - 4. Verification of use of required design mixture.
  - 5. Concrete placement, including conveying and depositing.
  - 6. Curing procedures and maintenance of curing temperature.
  - 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
  - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd. (4 cu. m), but less than 25 cu. yd. (19 cu. m), plus one set for each additional 50 cu. yd. (38 cu. m) or fraction thereof.
  - 2. Testing Frequency: Obtain at least one composite sample for each 100 cu. yd. (76 cu. m) or fraction thereof of each concrete mixture placed each day.
    - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
  - 3. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
  - 4. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  - 5. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
  - 6. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
  - 7. Compression Test Specimens: ASTM C 31/C 31M.
    - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
    - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

8. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
    - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
    - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
  9. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
  10. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi (3.4 MPa).
  11. Test results shall be reported in writing to Architect, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
  12. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Architect but will not be used as sole basis for approval or rejection of concrete.
  13. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Architect. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Architect.
  14. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
- E. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- F. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing.

END OF SECTION 03 3000

**SECTION 03 35 11  
CONCRETE FLOOR FINISHES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Liquid densifiers and hardeners.
- B. Polished concrete.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Finishing of concrete surface to tolerance; floating, troweling, and similar operations; curing.

**1.03 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the work with concrete floor placement and concrete floor curing.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's published data on each finishing product, including information on compatibility of different products and limitations.
- C. Maintenance Data: Provide data on maintenance and renewal of applied finishes.
- D. Warranty Documentation: Manufacturer warranty; ensure that forms have been completed in Owner's name and registered with manufacturer.

**1.05 MOCK-UP**

- A. For coatings, construct mock-up area under conditions similar to those that will exist during application, with coatings applied.
- B. Mock-Up Size: 10 feet square.
- C. Locate where directed.
- D. Mock-up may remain as part of the work.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver materials in manufacturer's sealed packaging, including application instructions.

**1.07 FIELD CONDITIONS**

- A. Do not finish floors until interior heating system is operational.
- B. Maintain ambient temperature of 50 degrees F minimum.

**1.08 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Correct defective work within a two-year period commencing on the Date of Substantial Completion.
- C. Finish Warranty: Provide five-year manufacturer warranty against excessive degradation of finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

**PART 2 PRODUCTS**

**2.01 DENSIFIERS AND HARDENERS**

- A. Liquid Densifier and Hardener: Penetrating chemical compound that reacts with concrete, filling the pores and dustproofing; for application to concrete after set.
  - 1. Products:
    - a. Retro-Plate 99, manufactured by Advanced Floor Products:  
[www.retroplatesystem.com](http://www.retroplatesystem.com).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.

## **2.02 POLISHED CONCRETE SYSTEM**

- A. Polished Concrete System: Materials, equipment, and procedures designed and furnished by a single manufacturer to produce dense polished concrete of the specified sheen.
  - 1. Acceptable Systems:
    - a. Retro-Plate 99, manufactured by Advanced Floor Products:  
www.retroplatesystem.com.
    - b. Substitutions: See Section 01 60 00 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that floor surfaces are acceptable to receive the work of this section.
- B. Verify that flaws in concrete have been patched and joints filled with methods and materials suitable for further finishes.

### **3.02 GENERAL**

- A. Apply materials in accordance with manufacturer's instructions.

### **3.03 CONCRETE POLISHING**

- A. Execute using materials, equipment, and procedures specified by manufacturer, using manufacturer approved installer.
  - 1. Final Polished Sheen: Satin finish; other sheens are included as comparison to illustrate required sheen; final sheen is before addition of any sealer or coating, regardless of whether that is also specified or not.
  - 2. Satin Finish: Reflecting images from side lighting.
- B. Protect finished surface as required and as recommended by manufacturer of polishing system.

**END OF SECTION**

**SECTION 03 54 00  
CAST UNDERLAYMENT**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Liquid-applied self-leveling floor underlayment.
  - 1. Use cementitious type at areas of wood sub-floor as topping slab.

**1.02 REFERENCE STANDARDS**

- A. ASTM C109/C109M - Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or (50-mm) Cube Specimens) 2020b.
- B. ASTM C1602/C1602M - Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete 2012.
- C. ASTM C348 - Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars 2020.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data sheets documenting physical characteristics and product limitations of underlayment materials. Include information on surface preparation, environmental limitations, and installation instructions.
- C. Certificate: Certify that products meet or exceed specified requirements.
- D. Manufacturer's Instructions.

**1.04 QUALITY ASSURANCE**

- A. Applicator Qualifications: Company specializing in performing the work of this section.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until ready for installation.
- B. Keep dry and protect from direct sun exposure, freezing, and ambient temperature greater than 105 degrees F.

**1.06 FIELD CONDITIONS**

- A. Do not install underlayment until floor penetrations and peripheral work are complete.
- B. Maintain minimum ambient temperatures of 50 degrees F 24 hours before, during and 72 hours after installation of underlayment.
- C. During the curing process, ventilate spaces to remove excess moisture.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Cementitious Underlayment:
  - 1. ARDEX Engineered Cements; ARDEX K15 with ARDEX recommended primer for wood substrate: [www.ardexamericas.com/#sle](http://www.ardexamericas.com/#sle).
  - 2. LATICRETE International, Inc; LATICRETE SUPERCAP SC500 with Laticrete approved primer for wood substrate: [www.laticretesupercap.com/#sle](http://www.laticretesupercap.com/#sle).
  - 3. Maxxon Corporation; Dek C-Ment with Maxxon approved primer: [www.maxxon.com/#sle](http://www.maxxon.com/#sle).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 MATERIALS**

- A. Cementitious Underlayment: Blended cement mix, that when mixed with water in accordance with manufacturer's directions will produce self-leveling underlayment with the following

properties:

1. Compressive Strength: Minimum 4000 pounds per square inch after 28 days, tested per ASTM C109/C109M.
  2. Flexural Strength: Minimum 1000 psi after 28 days, tested per ASTM C348.
  3. Density: 125 pounds per cubic foot, nominal.
  4. Final Set Time: 1-1/2 to 2 hours, maximum.
  5. Thickness: Capable of thicknesses from feather edge to maximum 3 inch.
  6. Surface Burning Characteristics: Flame spread/Smoke developed index of 0/0 in accordance with ASTM E84.
- B. Aggregate: Dry, well graded, washed silica aggregate, approximately 1/8 inch in size and acceptable to underlayment manufacturer.
- C. Reinforcement: Galvanized metal lath complying with recommendations of underlayment manufacturer for specific project circumstances.
- D. Water: ASTM C1602/C1602M; clean, potable, and not detrimental to underlayment mix materials.
- E. Primer: Manufacturer's recommended type.
- F. Joint and Crack Filler: Latex based filler, as recommended by manufacturer.

### **2.03 MIXING**

- A. Site mix materials in accordance with manufacturer's instructions.
1. Batch plant mixed materials are also acceptable provided manufacturer's instructions have been followed and verified.
- B. Add aggregate for areas where thickness will exceed 1/2 inch or as required by manufacturer. Mix underlayment and water for at least two minutes before adding aggregate, and continue mixing to assure that aggregate has been thoroughly coated.
- C. Mix to self-leveling consistency without over-watering.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate surfaces are clean, dry, unfrozen, do not contain petroleum byproducts, or other compounds detrimental to underlayment material bond to substrate.

### **3.02 PREPARATION**

- A. Wood: Install metal lath for reinforcement of underlayment.
- B. Remove substrate surface irregularities. Fill voids and deck joints with filler. Finish smooth.
- C. Vacuum clean surfaces.
- D. Prime substrate in accordance with manufacturer's instructions. Allow to dry.
- E. Close floor openings.

### **3.03 APPLICATION**

- A. Install underlayment in accordance with manufacturer's instructions.
- B. Pump or pour material onto substrate. Do not retemper or add water.
1. Pump, move, and screed while the material is still highly flowable.
  2. Be careful not to create cold joints.
  3. Wear spiked shoes while working in the wet material to avoid leaving marks.
- C. Place to indicated thickness, with top surface level to 1/8 inch in 10 ft.
- D. Place before partition installation.
- E. Where additional aggregate has been used in the mix, add a top layer of neat mix (without aggregate), if needed to level and smooth the surface.

### **3.04 CURING**

- A. Once underlayment starts to set, prohibit foot traffic until final set has been reached.
- B. Air cure in accordance with manufacturer's instructions.

### **3.05 FIELD QUALITY CONTROL**

- A. An independent testing agency will perform field inspection and testing, as specified in Section 01 40 00 - Quality Requirements.
- B. Placed Material: Agency will inspect and test for compliance with specification requirements.

### **3.06 PROTECTION**

- A. Protect against direct sunlight, heat, and wind; prevent rapid drying to avoid shrinkage and cracking.
- B. Do not permit traffic over unprotected floor underlayment surfaces.

**END OF SECTION**



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**SECTION 04 20 01  
MASONRY VENEER**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Clay facing brick.
- B. Mortar.
- C. Reinforcement and anchorage.
- D. Flashings.
- E. Installation of lintels.
- F. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 92 00 - Joint Sealants: Sealing control and expansion joints.

**1.03 REFERENCE STANDARDS**

- A. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- B. ASTM C67/C67M - Standard Test Methods for Sampling and Testing Brick and Structural Clay Tile 2020.
- C. ASTM C91/C91M - Standard Specification for Masonry Cement 2018.
- D. ASTM C216 - Standard Specification for Facing Brick (Solid Masonry Units Made From Clay or Shale) 2019.
- E. ASTM C270 - Standard Specification for Mortar for Unit Masonry 2019.
- F. ASTM D4637/D4637M - Standard Specification for EPDM Sheet Used in Single-Ply Roof Membrane 2015.
- G. BIA Technical Notes No. 7 - Water Penetration Resistance – Design and Detailing 2017.
- H. BIA Technical Notes No. 28B - Brick Veneer/Steel Stud Walls 2005.
- I. BIA Technical Notes No. 46 - Maintenance of Brick Masonry 2017.
- J. TMS 402/602 - Building Code Requirements and Specification for Masonry Structures 2016.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data for masonry units and mortar, flashing, ties and all other accessories.
- C. Samples: Submit color samples of mortar to illustrate color, texture, and extremes of color range.
- D. Manufacturer's Certificate: Certify that masonry units meet or exceed specified requirements.

**1.05 QUALITY ASSURANCE**

- A. Comply with provisions of TMS 402/602, except where exceeded by requirements of Contract Documents.
- B. Manufacturer Qualifications: Company specializing in manufacturing the type of products specified in this section with minimum three years of documented experience.
- C. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of documented experience.

## 1.06 MOCK-UP

- A. Construct a masonry wall as a mock-up panel sized 8 feet long by 6 feet high; include mortar and accessories and structural backup in mock-up.
- B. Mock-up may remain as part of the Work.

## 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, handle, and store masonry units by means that will prevent mechanical damage and contamination by other materials.

## 1.08 FIELD CONDITIONS

- A. Cold and Hot Weather Requirements: Comply with requirements of TMS 402/602 or applicable building code, whichever is more stringent.

## PART 2 PRODUCTS

### 2.01 BRICK UNITS

- A. Manufacturers:
  - 1. General Shale Brick; "Colonial Satin": [www.generalshale.com/#sle](http://www.generalshale.com/#sle).
- B. Facing Brick: ASTM C216, Type FBX, Grade SW.
  - 1. Color and Texture: To be selected.
  - 2. Nominal Size: Modular.
  - 3. Compressive Strength: 3,000 PSI, measured in accordance with ASTM C67/C67M.

### 2.02 MORTAR MATERIALS

- A. Masonry Cement: ASTM C91/C91M Type N.
  - 1. Colored Mortar: Premixed cement, color as selected.
- B. Water: Clean and potable.

### 2.03 REINFORCEMENT AND ANCHORAGE

- A. Masonry Veneer Anchors: 2-piece anchors that permit differential movement between masonry veneer and structural backup, hot dip galvanized to ASTM A 153/A 153M, Class B.
  - 1. Anchor plates: Not less than 0.075 inch thick, designed for fastening to structural backup through sheathing; provide design with legs that penetrate sheathing and insulation to provide positive anchorage.
  - 2. Wire ties: Manufacturer's standard shape, 0.1875 inch thick.
  - 3. Vertical adjustment: Not less than 1 inches.
  - 4. Manufacturers:
    - a. Hohmann & Barnard, Inc; 2-Seal™ Concrete Seal Tie: [www.h-b.com/#sle](http://www.h-b.com/#sle).
    - b. Hohmann & Barnard: 2-Seal Byna-Lock Wire Tie.
    - c. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.04 FLASHINGS

- A. Membrane Non-Asphaltic Flashing Materials:
  - 1. EPDM Flashing: ASTM D4637/D4637M, Type I, 0.040 inch thick.
- B. Flashing Sealant/Adhesives: Silicone, polyurethane, or silyl-terminated polyether/polyurethane, or other type required or recommended by flashing manufacturer; type capable of adhering to type of flashing used.
- C. Termination Bars: Stainless steel; compatible with membrane and adhesives.
- D. Lap Sealants and Tapes: As recommended by flashing manufacturer; compatible with membrane and adhesives.

## **2.05 ACCESSORIES**

- A. Preformed Control Joints: Rubber material. Provide with corner and tee accessories, fused joints.
- B. Joint Filler: Closed cell polyvinyl chloride; oversized 50 percent to joint width; self expanding; in maximum lengths available.
- C. Weeps:
  - 1. Type: Extruded propylene with honeycomb design.
  - 2. Color(s): As selected by Architect from manufacturer's full range.
- D. Cavity Vents:
  - 1. Type: Polyester mesh.
- E. Cavity Mortar Control: Semi-rigid polyethylene or polyester mesh panels, sized to thickness of wall cavity, and designed to prevent mortar droppings from clogging weeps and cavity vents and allow proper cavity drainage.
- F. Cleaning Solution: Non-acidic, not harmful to masonry work or adjacent materials.

## **2.06 MORTAR MIXING**

- A. Mortar for Unit Masonry: ASTM C270, Proportion Specification.
  - 1. Exterior, non-loadbearing masonry; Type N.
- B. Colored Mortar: Proportion selected pigments and other ingredients to match Architect's sample, without exceeding manufacturer's recommended pigment-to-cement ratio.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive masonry.
- B. Verify that related items provided under other sections are properly sized and located.
- C. Verify that built-in items are in proper location, and ready for roughing into masonry work.

### **3.02 COURSING**

- A. Establish lines, levels, and coursing indicated. Protect from displacement.
- B. Maintain masonry courses to uniform dimension. Form vertical and horizontal joints of uniform thickness.
- C. Brick Units:
  - 1. Bond: As indicated for different locations.
  - 2. Coursing: Three units and three mortar joints to equal 8 inches.
  - 3. Mortar Joints: Concave.

### **3.03 PLACING AND BONDING**

- A. Lay solid masonry units in full bed of mortar, with full head joints, uniformly jointed with other work.
- B. Lay hollow masonry units with face shell bedding on head and bed joints.
- C. Buttering corners of joints or excessive furrowing of mortar joints is not permitted.
- D. Remove excess mortar as work progresses.
- E. Interlock intersections and external corners, except for units laid in stack bond.
- F. Do not shift or tap masonry units after mortar has achieved initial set. Where adjustment must be made, remove mortar and replace.
- G. Perform job site cutting of masonry units with proper tools to provide straight, clean, unchipped edges. Prevent broken masonry unit corners or edges.

- H. Isolate top joint of masonry veneer from horizontal structural framing members or support angles with compressible joint filler.

### **3.04 WEEPS/CAVITY VENTS**

- A. Install weeps in veneer walls at 24 inches on center horizontally on top of through-wall flashing above shelf angles and lintels and at bottom of walls.
- B. Install cavity vents in veneer walls at 32 inches on center horizontally below shelf angles and lintels and at top of walls.

### **3.05 CAVITY MORTAR CONTROL**

- A. Do not permit mortar to drop or accumulate into cavity air space or to plug weep/cavity vents.
- B. For cavity walls, build inner wythe ahead of outer wythe to accommodate accessories.
- C. Install cavity mortar diverter at base of cavity and at other flashing locations as recommended by manufacturer to prevent mortar droppings from blocking weep/cavity vents.

### **3.06 REINFORCEMENT AND ANCHORAGE - MASONRY VENEER**

- A. Masonry Back-Up: Embed anchors to bond veneer at maximum 16 inches on center vertically and 16 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.
- B. Stud Back-Up: Secure veneer anchors to stud framed back-up and embed into masonry veneer at maximum 16 inches on center vertically and 16 inches on center horizontally. Place additional anchors at perimeter of openings and ends of panels, so maximum spacing of anchors is 8 inches on center.

### **3.07 MASONRY FLASHINGS**

- A. Whether or not specifically indicated, install masonry flashing to divert water to exterior at all locations where downward flow of water will be interrupted.
  - 1. Extend flashings full width at such interruptions and at least 6 inches, minimum, into adjacent masonry or turn up at least 1 inch, minimum, to form watertight pan at non-masonry construction.
  - 2. Remove or cover protrusions or sharp edges that could puncture flashings.
  - 3. Seal lapped ends and penetrations of flashing before covering with mortar.
- B. Terminate flashing up 8 inches minimum on vertical surface of backing:
  - 1. Install vertical leg of flashing over fluid-applied or self-adhered air/vapor barriers over backing or per manufacturer's directions.
- C. Install flashing in accordance with manufacturer's instructions and BIA Technical Notes No. 7.
- D. Support flexible flashings across gaps and openings.
- E. Extend EPDM flashings to within 1/2 inch of exterior face of masonry and adhere to top of stainless steel angled drip with hemmed edge.
- F. Lap end joints of flashings at least 6 inches, minimum, and seal watertight with flashing sealant/adhesive.

### **3.08 LINTELS**

- A. Install loose steel lintels over openings.
- B. Maintain minimum (see structural drawings) inch bearing on each side of opening.

### **3.09 CONTROL AND EXPANSION JOINTS**

- A. Do not continue horizontal joint reinforcement through control or expansion joints.
- B. Install preformed control joint device in continuous lengths. Seal butt and corner joints in accordance with manufacturer's instructions.
- C. Size control joints as indicated on drawings; if not indicated, 3/8 inch wide and deep.

D. Form expansion joint as detailed on drawings.

**3.10 TOLERANCES**

A. Install masonry within the site tolerances found in TMS 402/602.

**3.11 CUTTING AND FITTING**

A. Cut and fit for pipes and conduit. Coordinate with other sections of work to provide correct size, shape, and location.

**3.12 CLEANING**

A. Remove excess mortar and mortar smears as work progresses.

B. Clean soiled surfaces with cleaning solution.

C. Use non-metallic tools in cleaning operations.

**END OF SECTION**

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## SECTION 04 2200 - CONCRETE UNIT MASONRY

## PART 1 - GENERAL

## 1.1 SUMMARY

## A. Section Includes:

1. Concrete masonry units.
2. Steel reinforcing bars.

## 1.2 DEFINITIONS

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

## 1.3 ACTION SUBMITTALS

- A. Product Data: For each type of product.
- B. Shop Drawings: For reinforcing steel. Detail bending, lap lengths, and placement of unit masonry reinforcing bars. Comply with ACI 315.

## 1.4 INFORMATIONAL SUBMITTALS

- A. Material Certificates: For each type and size of product. For masonry units, include data on material properties.
- B. Mix Designs: For each type of mortar and grout. Include description of type and proportions of ingredients.
  1. Include test reports for mortar mixes required to comply with property specification. Test according to ASTM C 109/C 109M for compressive strength, ASTM C 1506 for water retention, and ASTM C 91/C 91M for air content.
  2. Include test reports, according to ASTM C 1019, for grout mixes required to comply with compressive strength requirement.

## 1.5 QUALITY ASSURANCE

- A. Sample Panels: Build sample panels to verify selections made under Sample submittals and to demonstrate aesthetic effects. Comply with requirements in Section 014000 "Quality Requirements" for mockups.



1. Build sample panels for each type of exposed unit masonry construction in sizes approximately 60 inches (1500 mm) long by 48 inches (1200 mm) high by full thickness.

## 1.6 FIELD CONDITIONS

- A. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace unit masonry damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.
- B. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 602/ACI 530.1/ASCE 6.

## PART 2 - PRODUCTS

### 2.1 UNIT MASONRY, GENERAL

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

### 2.2 CONCRETE MASONRY UNITS

- A. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
  1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
- B. CMUs: ASTM C 90.
  1. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1900 psi (13.1 MPa).
  2. Density Classification: Normal weight.
- C. Concrete Building Brick: ASTM C 55.
  1. Density Classification: Normal weight.

### 2.3 CONCRETE AND MASONRY LINTELS

- A. Concrete Lintels: ASTM C 1623, matching CMUs in color, texture, and density classification; and with reinforcing bars indicated. Provide lintels with net-area compressive strength not less than that of CMUs.

- B. Masonry Lintels: Prefabricated or built-in-place masonry lintels made from bond beam CMUs with reinforcing bars placed as indicated and filled with coarse grout. Cure precast lintels before handling and installing. Temporarily support built-in-place lintels until cured.

## 2.4 MORTAR AND GROUT MATERIALS

- A. Portland Cement: ASTM C 150/C 150M, Type I or II, except Type III may be used for cold-weather construction. Provide natural color or white cement as required to produce mortar color indicated.
- B. Hydrated Lime: ASTM C 207, Type S.
- C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.
- D. Mortar Pigments: Natural and synthetic iron oxides and chromium oxides, compounded for use in mortar mixes and complying with ASTM C 979/C 979M. Use only pigments with a record of satisfactory performance in masonry mortar.
  - 1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
    - a. Davis Colors.
    - b. Solomon Colors, Inc.
- E. Colored Cement Products: Packaged blend made from portland cement and hydrated lime and mortar pigments, all complying with specified requirements, and containing no other ingredients.
  - 1. Colored Portland Cement-Lime Mix:
    - a. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      - 1) Holcim (US) Inc.
      - 2) Lafarge North America Inc.
      - 3) Lehigh Hanson; HeidelbergCement Group.
- F. Aggregate for Mortar: ASTM C 144.
  - 1. White-Mortar Aggregates: Natural white sand or crushed white stone.
  - 2. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.
- G. Aggregate for Grout: ASTM C 404.
- H. Cold-Weather Admixture: Nonchloride, noncorrosive, accelerating admixture complying with ASTM C 494/C 494M, Type C, and recommended by manufacturer for use in masonry mortar of composition indicated.
- I. Water: Potable.

## 2.5 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. Interior Walls: Hot-dip galvanized, carbon steel.
  - 2. Exterior Walls: Hot-dip galvanized carbon steel.
  - 3. Wire Size for Side Rods: 0.187-inch (4.76-mm) diameter.
  - 4. Wire Size for Cross Rods: 0.187-inch (4.76-mm) diameter.
  - 5. Spacing of Cross Rods: Not more than 16 inches (407 mm) o.c.
  - 6. Provide in lengths of not less than 10 feet (3 m), with prefabricated corner and tee units.

## 2.6 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. Steel Sheet, Galvanized after Fabrication: ASTM A 1008/A 1008M, Commercial Steel, with ASTM A 153/A 153M, Class B coating.
  - 3. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- B. Adjustable Anchors for Connecting to Structural Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
  - 1. Anchor Section for Welding to Steel Frame: Crimped 1/4-inch- (6.35-mm-) diameter, hot-dip galvanized-steel wire.
  - 2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized-steel wire.
- C. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.
  - 1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from 0.060-inch- (1.52-mm-) thick steel sheet, galvanized after fabrication.
  - 2. Tie Section: Triangular-shaped wire tie made from 0.187-inch- (4.76-mm-) diameter, hot-dip galvanized-steel wire.
  - 3. Corrugated-Metal Ties: Metal strips not less than 7/8 inch (22 mm) wide with corrugations having a wavelength of 0.3 to 0.5 inch (7.6 to 12.7 mm) and an amplitude of 0.06 to 0.10 inch (1.5 to 2.5 mm) made from 0.060-inch- (1.52-mm-) thick steel sheet, galvanized after fabrication with dovetail tabs for inserting into dovetail slots in concrete.
- D. Partition Top Anchors: 0.105-inch- (2.66-mm-) thick metal plate with a 3/8-inch- (9.5-mm-) diameter metal rod 6 inches (152 mm) long welded to plate and with closed-end plastic tube

fitted over rod that allows rod to move in and out of tube. Fabricate from steel, hot-dip galvanized after fabrication.

- E. Rigid Anchors: Fabricate from steel bars 1-1/2 inches (38 mm) wide by 1/4 inch (6.35 mm) thick by 24 inches (610 mm) long, with ends turned up 2 inches (51 mm) or with cross pins unless otherwise indicated.
  - 1. Corrosion Protection: Hot-dip galvanized to comply with ASTM A 153/A 153M.

## 2.7 EMBEDDED FLASHING MATERIALS

- A. Metal Flashing: Provide metal flashing complying with Section 076200 "Sheet Metal Flashing and Trim" and as follows:

- 1. Fabricate metal sealant stops from stainless steel. Extend at least 3 inches (76 mm) into wall and out to exterior face of wall. At exterior face of wall, bend metal back on itself for 3/4 inch (19 mm) and down into joint 1/4 inch (6 mm) to form a stop for retaining sealant backer rod.
- 2. Fabricate metal expansion-joint strips from stainless steel to shapes indicated.

- B. Flexible Flashing: Use the following unless otherwise indicated:

- 1. EPDM Flashing: Sheet flashing product made from ethylene-propylene-diene terpolymer, complying with ASTM D 4637/D 4637M, 0.040 inch (1.0 mm) thick.
  - a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    - 1) Carlisle Coatings & Waterproofing; Pre-Kleened EPDM Thru-Wall Flashing.
    - 2) Firestone Specialty Products; FlashGuard.
    - 3) Heckmann Building Products Inc.; No. 81 EPDM Thru-Wall Flashing.
    - 4) Hohmann & Barnard, Inc.; Epra-Max EPDM Thru-Wall Flashing.

- C. Application: Unless otherwise indicated, use the following:

- 1. Where flashing is indicated to receive counterflashing, use metal flashing.
- 2. Where flashing is indicated to be turned down at or beyond the wall face, use metal flashing.
- 3. Where flashing is partly exposed and is indicated to terminate at the wall face, use metal flashing with a sealant stop or flexible flashing with a metal sealant stop.
- 4. Where flashing is fully concealed, use metal flashing or flexible flashing.

- D. Solder and Sealants for Sheet Metal Flashings: As specified in Section 076200 "Sheet Metal Flashing and Trim."

- E. Adhesives, Primers, and Seam Tapes for Flashings: Flashing manufacturer's standard products or products recommended by flashing manufacturer for bonding flashing sheets to each other and to substrates.

## 2.8 MISCELLANEOUS MASONRY ACCESSORIES

- A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.
- B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 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 felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).
- D. Weep/Cavity Vent Products: Use one of the following unless otherwise indicated:
  - 1. Cellular Plastic Weep/Vent: One-piece, flexible extrusion made from UV-resistant polypropylene copolymer, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe, in color selected from manufacturer's standard.
    - a. Products: Subject to compliance with requirements, provide one of the following:
      - 1) Advanced Building Products Inc.; Mortar Maze Cell Vent.
      - 2) Heckmann Building Products, Inc.; No. 85 Cell Vent.
      - 3) Hohmann & Barnard, Inc; QV Quadro-Vent.
  - 2. Mesh Weep/Vent: Free-draining mesh; made from polyethylene strands, full height and width of head joint and depth 1/8 inch (3 mm) less than depth of outer wythe; in color selected from manufacturer's standard.
    - a. Products: Subject to compliance with requirements, provide one of the following:
      - 1) Advanced Building Products Inc.; Mortar Break Weep Mesh.
      - 2) CavClear/Archovations, Inc.; CavClear Weep Vents.
      - 3) Mortar Net USA, Ltd; Mortar Net Weep Vents.
- E. Cavity Drainage Material: Free-draining mesh, made from polymer strands that will not degrade within the wall cavity.
  - 1. Products: Subject to compliance with requirements, provide one of the following:
    - a. Advanced Building Products Inc.; Mortar Break.
    - b. CavClear/Archovations, Inc.; CavClear Masonry Mat.
    - c. Hohmann & Barnard, Inc; Mortar Trap.
    - d. Mortar Net USA, Ltd; Mortar Net.
  - 2. Configuration: Provide one of the following:
    - a. Strips, full depth of cavity and 10 inches (250 mm) high, with dovetail shaped notches 7 inches (175 mm) deep that prevent clogging with mortar droppings.

- b. Strips, not less than 1-1/2 inches (38 mm) thick and 10 inches (250 mm) high, with dimpled surface designed to catch mortar droppings and prevent weep holes from clogging with mortar.

## 2.9 MORTAR AND GROUT MIXES

- A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
  1. Do not use calcium chloride in mortar or grout.
  2. Use portland cement-lime mortar unless otherwise indicated.
  3. Add cold-weather admixture (if used) at same rate for all mortar that will be exposed to view, regardless of weather conditions, to ensure that mortar color is consistent.
- 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, Property Specification. Provide the following types of mortar for applications stated unless another type is indicated.
  1. For masonry below grade or in contact with earth, use Type M.
  2. For reinforced masonry, use Type S.
  3. For exterior, above-grade, load-bearing and nonload-bearing walls and parapet walls; for interior load-bearing walls; for interior nonload-bearing partitions; and for other applications where another type is not indicated, use Type N.
  4. For interior nonload-bearing partitions, Type O may be used instead of Type N.
- D. Grout for Unit Masonry: Comply with ASTM C 476.
  1. Use grout of type indicated or, if not otherwise indicated, of type (fine or coarse) that will comply with TMS 602/ACI 530.1/ASCE 6 for dimensions of grout spaces and pour height.
  2. Proportion grout in accordance with ASTM C 476, Table 1 or paragraph 4.2.2 for specified 28-day compressive strength indicated, but not less than 2000 psi (14 MPa).
  3. Provide grout with a slump of 8 to 11 inches (200 to 280 mm) as measured according to ASTM C 143/C 143M.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

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

### 3.2 TOLERANCES

#### A. Dimensions and Locations of Elements:

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

#### B. Lines and Levels:

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

#### 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 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).
3. For exposed head joints, do not vary from thickness indicated by more than plus or minus 1/8 inch (3 mm).

### 3.3 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. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.
- D. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

- E. 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.
- F. Fill cores in hollow CMUs with grout 24 inches (600 mm) under bearing plates, beams, lintels, posts, and similar items unless otherwise indicated.

### 3.4 MORTAR BEDDING AND JOINTING

- A. Lay hollow CMUs as follows:
  - 1. Bed face shells in mortar and make head joints of depth equal to bed joints.
  - 2. Bed webs in mortar in all courses of piers, columns, and pilasters.
  - 3. Bed webs in mortar in grouted masonry, including starting course on footings.
  - 4. Fully bed entire units, including areas under cells, at starting course on footings where cells are not grouted.
- B. Lay solid CMUs with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.
- C. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.
- D. Cut joints flush for masonry walls to receive plaster or other direct-applied finishes (other than paint) unless otherwise indicated.

### 3.5 ANCHORED MASONRY VENEERS

- A. Anchor masonry veneers to wall framing and concrete and masonry backup with masonry-veneer anchors to comply with the following requirements:
  - 1. Fasten screw-attached anchors through sheathing to wall framing and to concrete and masonry backup with metal fasteners of type indicated. Use two fasteners unless anchor design only uses one fastener.
  - 2. Embed tie sections in masonry joints.
  - 3. Locate anchor sections to allow maximum vertical differential movement of ties up and down.
  - 4. Space anchors as indicated, but not more than 18 inches (458 mm) o.c. vertically and 24 inches (610 mm) o.c. horizontally, with not less than one anchor for each 2 sq. ft. (0.2 sq. m) of wall area. Install additional anchors within 12 inches (305 mm) of openings and at intervals, not exceeding 8 inches (203 mm), around perimeter.

### 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.
- B. Interrupt joint reinforcement at control and expansion joints unless otherwise indicated.
- C. Provide continuity at wall intersections by using prefabricated T-shaped units.
- D. Provide continuity at corners by using prefabricated L-shaped units.

### 3.7 ANCHORING MASONRY TO STRUCTURAL STEEL AND CONCRETE

- A. Anchor masonry to structural steel and concrete, where masonry abuts or faces structural steel or concrete, to comply with the following:
1. Provide an open space not less than 1 inch (25 mm) wide between masonry and structural steel or concrete unless otherwise indicated. Keep open space free of mortar and other rigid materials.
  2. Anchor masonry with anchors embedded in masonry joints and attached to structure.
  3. Space anchors as indicated, but not more than 24 inches (610 mm) o.c. vertically and 36 inches (915 mm) o.c. horizontally.

### 3.8 FLASHING, WEEP HOLES, AND CAVITY VENTS

- A. General: Install embedded flashing and weep holes in masonry at shelf angles, lintels, ledges, other obstructions to downward flow of water in wall, and where indicated.
- B. Install flashing as follows unless otherwise indicated:
1. Prepare masonry surfaces so they are smooth and free from projections that could puncture flashing. Where flashing is within mortar joint, place through-wall flashing on sloping bed of mortar and cover with mortar. Before covering with mortar, seal penetrations in flashing with adhesive, sealant, or tape as recommended by flashing manufacturer.
  2. At lintels and shelf angles, extend flashing a minimum of 6 inches (150 mm) into masonry at each end. At heads and sills, extend flashing 6 inches (150 mm) at ends and turn up not less than 2 inches (50 mm) to form end dams.
  3. Install metal drip edges beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal drip edge.
  4. Install metal flashing termination beneath flexible flashing at exterior face of wall. Stop flexible flashing 1/2 inch (13 mm) back from outside face of wall, and adhere flexible flashing to top of metal flashing termination.
- C. Install weep holes in exterior wythes and veneers in head joints of first course of masonry immediately above embedded flashing.
1. Use specified weep/cavity vent products to form weep holes.

2. Space weep holes 24 inches (600 mm) o.c. unless otherwise indicated.
  3. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.
- D. Place cavity drainage material in airspace behind veneers to comply with configuration requirements for cavity drainage material in "Miscellaneous Masonry Accessories" Article.

### 3.9 REINFORCED UNIT MASONRY INSTALLATION

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

### 3.10 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage special inspectors to perform tests and inspections and prepare reports. Allow inspectors access to scaffolding and work areas as needed to perform tests and inspections. Retesting of materials that fail to comply with specified requirements shall be done at Contractor's expense.
- B. Inspections: Special inspections according to Level B in TMS 402/ACI 530/ASCE 5.
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. Prism Test: For each type of construction provided, according to ASTM C 1314 at seven days and at 28 days.

### 3.11 REPAIRING, POINTING, AND CLEANING

- A. In-Progress Cleaning: Clean unit masonry as work progresses by dry brushing to remove mortar fins and smears before tooling joints.
- B. Final Cleaning: After mortar is thoroughly set and cured, clean exposed masonry as follows:
  - 1. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes.
  - 2. Clean concrete masonry by applicable cleaning methods indicated in NCMA TEK 8-4A.

### 3.12 MASONRY WASTE DISPOSAL

- A. Waste Disposal as Fill Material: Dispose of clean masonry waste, including excess or soil-contaminated sand, waste mortar, and broken masonry units, by crushing and mixing with fill material as fill is placed.
  - 1. Do not dispose of masonry waste as fill within 18 inches (450 mm) of finished grade.
- B. Masonry Waste Recycling: Return broken CMUs not used as fill to manufacturer for recycling.
- C. Excess Masonry Waste: Remove excess clean masonry waste that cannot be used as fill, as described above or recycled, and other masonry waste, and legally dispose of off Owner's property.

END OF SECTION 04 2200

## SECTION 05 1200 - STRUCTURAL STEEL FRAMING

## PART 1 - GENERAL

## 1.1 SUMMARY

## A. Section Includes:

1. Structural steel.
2. Grout.

## 1.2 DEFINITIONS

- A. Structural Steel: Elements of structural-steel frame, as classified by AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

## 1.3 SUBMITTALS

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

- B. Shop Drawings: Show fabrication of structural-steel components.

1. Include details of cuts, connections, splices, camber, holes, and other pertinent data.
2. Include embedment drawings.
3. Indicate welds by standard AWS symbols, distinguishing between shop and field welds, and show size, length, and type of each weld. Show backing bars that are to be removed and supplemental fillet welds where backing bars are to remain.
4. Indicate type, size, and length of bolts, distinguishing between shop and field bolts. Identify pretensioned and slip-critical high-strength bolted connections.

- C. Erection Drawings:

1. Submit erection drawings defining location of each assembly or piece within the structure. Provide sufficient details to describe all field welding. Clearly identify all high strength bolts not required to be tensioned ("snug tight" as defined by AISC). If drawings are submitted in multiple packages, each submittal shall be complete with all erection drawings, details and piece drawings. Subsequent submittals of erection drawings which modify or add to earlier versions will be clearly marked.
2. Submit setting drawings for bolts and plates installed by others.

- D. Reproduction of the Contract Documents is not permitted.

- E. Contractor requested changes:

1. All Contractor requests for substitutions of member sizes or material grades or modification of the strength or configuration of the structural framing for the Contractors

convenience, erection sequence, or construction equipment, shall be subject to Architect's written approval.

- F. Qualification Data: For qualified Installer fabricator and testing agency.
- G. Welding certificates.
- H. Mill test reports for structural steel, including chemical and physical properties.
- I. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers, certifying that shop primers are compatible with topcoats.
- J. 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.
- K. Source quality-control reports.

#### 1.4 QUALITY ASSURANCE

- A. Fabricator and Installer Qualifications: Experienced in fabrication and erection of structural steel for projects of similar size and difficulty.
- B. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M, "Structural Welding Code - Steel."
- C. Comply with applicable provisions of the following specifications and documents:
  - 1. AISC 303.
- D. Protection: Protect any adjacent materials or areas below from damage due to weld splatter or sparks during field welding.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

- A. Store materials to permit easy access for inspection and identification. Keep steel members off ground and spaced by using pallets, dunnage, or other supports and spacers. Protect steel members and packaged materials from corrosion and deterioration.
  - 1. Do not store materials on structure in a manner that might cause distortion, damage, or overload to members or supporting structures. Repair or replace damaged materials or structures as directed.
- B. Store fasteners in a protected place in sealed containers with manufacturer's labels intact.

1. Fasteners may be repackaged provided Owner's testing and inspecting agency observes repackaging and seals containers.
2. Clean and relubricate bolts and nuts that become dry or rusty before use.
3. Comply with manufacturers' written recommendations for cleaning and lubricating ASTM F 1852 fasteners and for retesting fasteners after lubrication.

## 1.6 COORDINATION

- A. Coordinate selection of shop primers with topcoats to be applied over them. Comply with paint and coating manufacturers' recommendations to ensure that shop primers and topcoats are compatible with one another.
- B. Coordinate installation of anchorage items to be embedded in or attached to other construction without delaying the Work. Provide setting diagrams, sheet metal templates, instructions, and directions for installation.

## PART 2 - PRODUCTS

### 2.1 STRUCTURAL-STEEL MATERIALS

- A. W-Shapes: ASTM A 992/A 992M.
- B. Channels, Angles, M , S-Shapes: ASTM A 36/A 36M.
- C. Plate and Bar: ASTM A 36/A 36M.
- D. Rectangular or Square Cold-Formed Hollow Structural Sections: ASTM A 500, Grade B, structural tubing.
- E. Round Cold-Formed Hollow Structural Sections and Steel Pipe: ASTM A 53/A 53M, Type E or S, Grade B.
- F. Steel Castings: ASTM A 216/A 216M, Grade WCB with supplementary requirement S11.
- G. Steel Forgings: ASTM A 668/A 668M.
- H. 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), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade C, (ASTM A 563M, Class 8S) heavy-hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers; all with plain finish.
- B. Zinc-Coated High-Strength Bolts, Nuts, and Washers: ASTM A 325 (ASTM A 325M), Type 1, heavy-hex steel structural bolts; ASTM A 563, Grade DH (ASTM A 563M, Class 10S) heavy-

hex carbon-steel nuts; and ASTM F 436 (ASTM F 436M), Type 1, hardened carbon-steel washers.

1. Finish: Hot-dip or mechanically deposited zinc coating.
- 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. Unheaded Anchor Rods: ASTM F 1554, Grade 55, U.N.O.
- E. Headed Anchor Rods: ASTM F 1554, Grade 55, straight, U.N.O.
- F. Threaded Rods: ASTM A 36/A 36M.
- G. Eye Bolts and Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1030.
- H. Sleeve Nuts: Made from cold-finished carbon steel bars, ASTM A 108, Grade 1018.

## 2.3 PRIMER

- A. Primer: Comply with Division 09 painting Sections.
- B. Primer: SSPC-Paint 25, Type I or Type II, zinc oxide, alkyd, linseed oil primer.
- C. Galvanizing Repair Paint: MPI#18, MPI#19, or SSPC-Paint 20.

## 2.4 GROUT

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

## 2.5 FABRICATION

- A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC's "Code of Standard Practice for Steel Buildings and Bridges" and AISC 360.
  1. Camber structural-steel members 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. Shear Connectors: Prepare steel surfaces as recommended by manufacturer of shear connectors. Use automatic end welding of headed-stud shear connectors according to AWS D1.1/D1.1M and manufacturer's written instructions.
- F. Holes: Provide holes required for securing other work to structural steel and for other work to pass through steel framing members.
  - 1. Cut, drill, or punch holes perpendicular to steel surfaces. Do not thermally cut bolt holes or enlarge holes by burning.
  - 2. Baseplate Holes: Cut, drill, mechanically thermal cut, or punch holes perpendicular to steel surfaces.
  - 3. Weld threaded nuts to framing and other specialty items indicated to receive other work.

## 2.6 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.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.

## 2.7 SHOP PRIMING

- A. Shop prime steel surfaces except the following:
  - 1. Surfaces embedded in concrete or mortar. Extend priming of partially embedded members to a depth of 2 inches (50 mm).
  - 2. Surfaces not exposed to view, or to moisture or weather.
  - 3. Surfaces to be field welded.
  - 4. Surfaces to be high-strength bolted with slip-critical connections.
  - 5. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
  - 6. Galvanized surfaces.
- B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
  - 1. SSPC-SP 3, "Power Tool Cleaning."



- C. Priming: Immediately after surface preparation, apply primer according to manufacturer's written instructions and at rate recommended by SSPC to provide a minimum dry film thickness of 1.5 mils (0.038 mm). Use priming methods that result in full coverage of joints, corners, edges, and exposed surfaces.
  - 1. Stripe paint corners, crevices, bolts, welds, and sharp edges.
  - 2. Apply two coats of shop paint to surfaces that are inaccessible after assembly or erection. Change color of second coat to distinguish it from first.

## 2.8 SOURCE QUALITY CONTROL

- A. Testing Agency: Owner will engage an independent testing and inspecting agency to perform shop tests and inspections and prepare test reports.
  - 1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.
- B. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.
- C. Bolted Connections: Shop-bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- D. Welded Connections: In addition to visual inspection, shop-welded connections will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
  - 1. Liquid Penetrant Inspection: ASTM E 165.
  - 2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
  - 3. Ultrasonic Inspection: ASTM E 164.
  - 4. Radiographic Inspection: ASTM E 94.
- E. In addition to visual inspection, shop-welded shear connectors will be tested and inspected according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
  - 1. Bend tests will be performed if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
  - 2. Tests will be conducted on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.

## PART 3 - EXECUTION

### 3.1 EXAMINATION

- A. Verify, with steel Erector present, elevations of concrete- and masonry-bearing surfaces and locations of anchor rods, bearing plates, and other embedments for compliance with requirements.

1. Prepare a certified survey of bearing surfaces, anchor rods, bearing plates, and other embedments showing dimensions, locations, angles, and elevations.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

### 3.2 PREPARATION

- A. Provide temporary shores, guys, braces, and other supports during erection to keep structural steel secure, plumb, and in alignment against temporary construction loads and loads equal in intensity to design loads. Remove temporary supports when permanent structural steel, connections, and bracing are in place unless otherwise indicated.

### 3.3 ERECTION

- A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
- B. Base 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's "Code of Standard Practice for Steel Buildings and Bridges."
- D. Align and adjust various members that form part of complete frame or structure before permanently fastening. Before assembly, clean bearing surfaces and other surfaces that will be in permanent contact with members. Perform necessary adjustments to compensate for discrepancies in elevations and alignment.
1. Level and plumb individual members of structure.
  2. Make allowances for difference between temperature at time of erection and mean temperature when structure is completed and in service.
- E. Splice members only where indicated.
- F. Do not use thermal cutting during erection unless approved by Architect. Finish thermally cut sections within smoothness limits in AWS D1.1/D1.1M.
- 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.
- B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
  - 1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
  - 2. Assemble and weld built-up sections by methods that will maintain true alignment of axes without exceeding tolerances in AISC's "Code of Standard Practice for Steel Buildings and Bridges" for mill material.

### 3.5 FIELD QUALITY CONTROL

- A. Testing Agency: Owner will engage a qualified independent testing and inspecting agency to inspect field welds and high-strength bolted connections.
- B. Bolted Connections: Bolted connections will be inspected according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts."
- C. Welded Connections: Field welds will be visually inspected according to AWS D1.1/D1.1M.
  - 1. In addition to visual inspection, field welds will be tested and inspected according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
    - a. Liquid Penetrant Inspection: ASTM E 165.
    - b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration will not be accepted.
    - c. Ultrasonic Inspection: ASTM E 164.
    - d. Radiographic Inspection: ASTM E 94.
- D. In addition to visual inspection, test and inspect field-welded shear connectors according to requirements in AWS D1.1/D1.1M for stud welding and as follows:
  - 1. Perform bend tests if visual inspections reveal either a less-than-continuous 360-degree flash or welding repairs to any shear connector.
  - 2. Conduct tests on additional shear connectors if weld fracture occurs on shear connectors already tested, according to requirements in AWS D1.1/D1.1M.
- E. Correct deficiencies in Work that test reports and inspections indicate does not comply with the Contract Documents.

3.6 REPAIRS AND PROTECTION

- A. 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 05 1200

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## SECTION 05 2000 – STEEL JOIST FRAMING

## PART 1 - GENERAL

## 1.1 RELATED DOCUMENTS

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

## 1.2 SUMMARY

- A. This Section includes the following:
  - 1. K-series and KCS-series steel joists.
  - 2. Long-span steel joists.
  - 3. Joist girders.
  - 4. Joist accessories.
  - 5. Architecturally Exposed Joists and Joist Accessories
- B. Related Sections include the following:
  - 1. 03 3000—Cast-in-Place Concrete.
  - 2. 04 2200—Concrete Unit Masonry.
  - 3. 05 1200 – Structural Steel Framing

## 1.3 DEFINITIONS

- A. SJI "Specifications": Steel Joist Institute's "Standard Specifications, Load Tables and Weight Tables for Steel Joists and Joist Girders."
- B. Special Joists: Steel joists or joist girders requiring modification by manufacturer to support nonuniform, unequal, or special loading conditions that invalidate load tables in SJI's "Specifications."
- C. Architecturally Exposed Joists and Joist Accessories: joists and joist accessories that is within 20 feet vertically and horizontally of a walking surface and is visible to a person standing on that walking surface or is designated "Architecturally Exposed" in the Contract Documents.

## 1.4 PERFORMANCE REQUIREMENTS

- A. Design special joists to withstand design loads with live load deflections no greater than the following:
  - 1. Roof Joists: Vertical deflection of 1/240 of the span.
  - 2. Roof Joists supporting CMU/Brick veneer: Vertical deflection of 1/600 of the span.

### 1.5 SUBMITTALS

- A. Shop Drawings: Show layout, designation, number, type, location, and spacings of joists. Include joining and anchorage details, bracing, bridging, joist accessories; splice and connection locations and details; and attachments to other construction.
  - 1. Indicate locations and details of bearing plates to be embedded in other construction.
  - 2. Comprehensive engineering analysis of special joists signed and sealed by the qualified professional engineer responsible for its preparation.
- B. Field quality-control test and inspection reports.

### 1.6 QUALITY ASSURANCE

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

### 1.7 DELIVERY, STORAGE, AND HANDLING

- A. Deliver, store, and handle joists as recommended in SJI's "Specifications."
- B. Protect joists from corrosion, deformation, and other damage during delivery, storage, and handling.

### 1.8 SEQUENCING

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

## PART 2 - PRODUCTS

### 2.1 MATERIALS

- A. Steel: Comply with SJI's "Specifications" for web and steel-angle chord members.
- B. Recycled Content: Provide products with an average recycled content of steel products so postconsumer recycled content plus one-half preconsumer recycled content is not less than 80 percent.

- C. Steel Bearing Plates: ASTM A 36/A 36M.
- D. Welding Electrodes: Comply with AWS standards.

## 2.2 PRIMERS

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

## 2.3 K-SERIES AND KCS-SERIES STEEL JOISTS

- A. Manufacture steel joists of type indicated according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members, underslung ends, and parallel top chord.
  - 1. Joist Type: K-series and KCS-series steel joists.
- B. Steel Joist Substitutes: Manufacture according to "Standard Specifications for Open Web Steel Joists, K-Series" in SJI's "Specifications," with steel-angle or -channel members.
- C. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- D. Provide holes in chord members for connecting and securing other construction to joists.
- E. Camber joists according to SJI's "Specifications."
- F. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

## 2.4 LONG-SPAN STEEL JOISTS/JOIST GIRDERS

- A. Manufacture steel joists according to "Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series" in SJI's "Specifications," with steel-angle top- and bottom-chord members; of joist type and end and top-chord arrangements as follows:
  - 1. Joist Type: LH-series steel joists and DLH-series steel joists.
  - 2. End Arrangement: Underslung.
  - 3. Top-Chord Arrangement: Parallel or Pitched 1/4 inch per 12 inches, 2 ways, as indicated on the Structural drawings.
- B. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- C. Provide holes in chord members for connecting and securing other construction to joists.
- D. Camber long-span steel joists according to SJI's "Specifications."



- E. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.
- F. Comply with AWS requirements and procedures for shop welding, appearance, quality of welds, and methods used in correcting welding work.
- G. Provide holes in chord members for connecting and securing other construction to joist girders.
- H. Camber joist girders according to SJI's "Specifications."
- I. Equip bearing ends of joists with manufacturer's standard beveled ends or sloped shoes if joist slope exceeds 1/4 inch per 12 inches.

## 2.5 JOIST ACCESSORIES

- A. Bridging: Provide bridging anchors and number of rows of horizontal or diagonal bridging of material, size, and type required by SJI's "Specifications" for type of joist, chord size, spacing, and span. Furnish additional erection bridging if required for stability.
- B. Fabricate steel bearing plates with integral anchorages of sizes and thicknesses indicated.
- C. Steel bearing plates with integral anchorages are specified in Division 5 Section "Metal Fabrications."
- D. Supply ceiling extensions, either extended bottom-chord elements or a separate extension unit of enough strength to support ceiling construction. Extend ends to within 1/2 inch of finished wall surface, unless otherwise indicated.
- E. Supply miscellaneous accessories, including splice plates and bolts required by joist manufacturer to complete joist installation.

## 2.6 CLEANING AND SHOP PAINTING

- A. Shop prime joists and joist accessories 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. Surfaces to receive sprayed fire-resistive materials.
  - 4. Galvanized surfaces.
- B. Surface Preparation for Architecturally Exposed Nongalvanized joists and joist accessories: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
  - 1. SSPC-SP 2, "Hand Tool Cleaning."
- C. Preparing Architecturally Exposed Galvanized joists and joist accessories for Shop Priming: After galvanizing, thoroughly clean steel of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

- D. Priming Architecturally Exposed joists and joist accessories: 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. 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.
- E. Surface Preparation for Nongalvanized Joists and Joist accessories (not architecturally exposed): clean and remove loose scale, heavy rust, and other foreign materials from fabricated joists and accessories by hand-tool cleaning, SSPC-SP 2 or power-tool cleaning, SSPC-SP 3.
- F. Priming Joists and Joist Accessories (not architecturally exposed): Apply 1 coat of shop primer to joists and joist accessories to be primed to provide a continuous, dry paint film not less than 1 mil thick.

### PART 3 - EXECUTION

#### 3.1 EXAMINATION

- A. Examine supporting substrates, embedded bearing plates, and abutting structural framing for compliance with requirements for installation tolerances and other conditions affecting performance.
- B. Examine Architecturally Exposed Joists for twists, kinks, warping, gouges, and other imperfections before erecting.
- C. Proceed with installation only after unsatisfactory conditions have been corrected.

#### 3.2 INSTALLATION

- A. Do not install joists until supporting construction is in place and secured.
- B. Install joists and accessories plumb, square, and true to line; securely fasten to supporting construction according to SJI's "Specifications," joist manufacturer's written recommendations, and requirements in this Section.
  - 1. Before installation, splice joists delivered to Project site in more than one piece.
  - 2. Space, adjust, and align joists accurately in location before permanently fastening.
  - 3. Install temporary bracing and erection bridging, connections, and anchors to ensure that joists are stabilized during construction.
  - 4. If possible, for Architecturally Exposed Joists, locate welded tabs for attaching temporary bracing and safety cabling where they will be concealed from view in the completed Work.
  - 5. Delay rigidly connecting bottom-chord extensions to columns or supports until dead loads have been applied.

- C. Field welded joists to supporting steel bearing plates and framework. Coordinate welding sequence and procedure with placement of joists. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.
- D. Bolted joists to supporting steel framework using high-strength structural bolts. Comply with RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts" for high-strength structural bolt installation and tightening requirements.
- E. Install and connect bridging concurrently with joist erection, before construction loads are applied. Anchor ends of bridging lines at top and bottom chords if terminating at walls or beams.

### 3.3 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to inspect field welds and to perform field tests and inspections and prepare test and inspection reports.
- B. Field welds will be visually inspected according to AWS D1.1/D1.1M.
- C. High-strength, field-bolted connections will be tested and verified according to procedures in RCSC's "Specification for Structural Joints Using ASTM A 325 or ASTM A 490 Bolts."
- D. Correct deficiencies in Work that test and inspection reports have indicated are not in compliance with specified requirements.
- E. Additional testing will be performed to determine compliance of corrected Work with specified requirements.

### 3.4 REPAIRS AND PROTECTION

- A. Touchup Painting: After installation, promptly clean, prepare, and prime or reprime field connections, rust spots, and abraded surfaces of prime-painted joists, bearing plates, abutting structural steel, and accessories.
  - 1. Clean and prepare surfaces by hand-tool cleaning, SSPC-SP 2, or power-tool cleaning, SSPC-SP 3.
  - 2. Apply a compatible primer of same type as shop primer used on adjacent surfaces.

- 3.5 Provide final protection and maintain conditions, in a manner acceptable to Manufacturer and Installer, that ensure that joists and accessories are without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 2000

## SECTION 05 3100 - STEEL DECKING

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Roof deck.

## 1.2 SUBMITTALS

- A. Product Data: For each type of deck, accessory, and product indicated.
- B. Shop Drawings: Show layout and types of deck panels, anchorage details, reinforcing channels, pans, cut deck openings, special jointing, accessories, and attachments to other construction.
- C. Product Certificates: For each type of steel deck, signed by product manufacturer.
- D. Welding certificates.
- E. Field quality-control test and inspection reports.
- F. Research/Evaluation Reports: For steel deck.

## 1.3 QUALITY ASSURANCE

- A. Testing Agency Qualifications: An independent agency qualified according to ASTM E 329 for testing indicated.
- B. Welding: Qualify procedures and personnel according to AWS D1.3, "Structural Welding Code - Sheet Steel."
- C. 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."

## 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

## PART 2 - PRODUCTS

## 2.1 ROOF

- A. Steel Roof Deck: Fabricate panels, without top-flange stiffening grooves, to comply with "SDI Specifications and Commentary for Steel Roof Deck," in SDI Publication No. 30, and with the following:
  - 1. Prime-Painted Steel Sheet: ASTM A 1008/A 1008M, Structural Steel (SS), Grade 33 (230) minimum, shop primed with manufacturer's standard baked-on, rust-inhibitive primer.
    - a. Color: Manufacturer's standard.
  - 2. Deck Profile: As indicated.
  - 3. Design Uncoated Steel Thickness: As indicated.
  - 4. Span Condition: As indicated.
  - 5. Side Laps: Overlapped and fastened as indicated.

## 2.2 ACCESSORIES

- A. General: Provide manufacturer's standard accessory materials for deck that comply with requirements indicated.
- B. Mechanical Fasteners: Corrosion-resistant, low-velocity, power-actuated or pneumatically driven carbon-steel fasteners; or self-drilling, self-threading screws.
- C. Side-Lap Fasteners: Corrosion-resistant, hexagonal washer head; self-drilling, carbon-steel screws, No. 10 minimum diameter.
- D. Flexible Closure Strips: Vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength of 33,000 psi, not less than 0.0359-inch design uncoated thickness, of same material and finish as deck; of profile indicated or required for application.
- F. Pour Stops and Girder Fillers: Steel sheet, minimum yield strength of 33,000 psi, of same material and finish as deck, and of thickness and profile recommended by SDI Publication No. 30 for overhang and slab depth.
- G. Column Closures, End Closures, Z-Closures, and Cover Plates: Steel sheet, of same material, finish, and thickness as deck, unless otherwise indicated.
- H. Weld Washers: Uncoated steel sheet, shaped to fit deck rib, 0.0598 inch thick, with factory-punched hole of 3/8-inch minimum diameter.
- I. Galvanizing Repair Paint: ASTM A 780.
- J. 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. When stud shear connectors are to be welded through metal deck to the top flange of beams. To receive such studs beams shall be unpainted and free of debris prior to installation of the deck.

## 3.2 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary in SDI Publication No. 30, manufacturer's written instructions, and requirements in this Section.
- B. Install temporary shoring before placing deck panels, if required to meet deflection limitations.
- C. Locate deck bundles to prevent overloading of supporting members.
- D. Place deck panels on supporting frame and adjust to final position with ends accurately aligned and bearing on supporting frame before being permanently fastened. Do not stretch or contract side-lap interlocks.
- E. Place deck panels flat and square and fasten to supporting frame without warp or deflection.
- F. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to deck.
- G. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of deck, and support of other work.
- H. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used for correcting welding work.

## 3.3 ROOF-DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
  - 1. Weld Diameter: 3/4" or 5/8 inch, nominal, as indicated on the plans.
  - 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 6 inches apart, maximum.
- 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, and as follows:

1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws.
- C. End Bearing: Install deck ends over supporting frame with a minimum end bearing of 1-1/2 inches, with end joints as follows:
  1. End Joints: Lapped 2 inches minimum.
- D. Miscellaneous Roof-Deck Accessories: Install ridge and valley plates, finish strips, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld or mechanically fasten to substrate to provide a complete deck installation.
  1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.
- E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's written instructions to ensure complete closure.

### 3.4 FIELD QUALITY CONTROL

- A. Testing Agency: Engage a qualified independent testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Field welds will be subject to inspection.
- C. Testing agency will report inspection results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Verification of proper size, number, and location of stud shear connectors installed directly to steel and through metal deck.
- F. Weld testing of shear stud connectors installed through metal deck shall be tested as specified in the Structural Steel section of these specifications.
- G. Additional inspecting, at Contractor's expense, will be performed to determine compliance of corrected work with specified requirements.

### 3.5 REPAIRS AND PROTECTION

- A. Provide final protection and maintain conditions to ensure that steel deck is without damage or deterioration at time of Substantial Completion.

END OF SECTION 05 3100

## SECTION 05 5000 - METAL FABRICATIONS

## PART 1 - GENERAL

## 1.1 SUMMARY

## A. Section Includes:

1. Miscellaneous steel framing and supports.
2. Shelf angles.
3. Miscellaneous steel trim.
4. Metal bollards.
5. Loose bearing and leveling plates.

## B. Products furnished, but not installed, under this Section include the following:

1. Loose steel lintels.
2. Anchor bolts, steel pipe sleeves, slotted-channel inserts, and wedge-type inserts indicated to be cast into concrete or built into unit masonry.
3. Steel weld plates and angles for casting into concrete for applications where they are not specified in other Sections.

## 1.2 ACTION SUBMITTALS

- A. Shop Drawings: Show fabrication and installation details. Include plans, elevations, sections, and details of metal fabrications and their connections. Show anchorage and accessory items.
- B. Delegated-Design Submittal: For ladders, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

## PART 2 - PRODUCTS

## 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design ladders.
- B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on exterior metal fabrications by preventing buckling, opening of joints, overstressing of components, failure of connections, and other detrimental effects.
  1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.



## 2.2 METALS

- A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For metal fabrications exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
- B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
- C. Stainless-Steel Bars and Shapes: ASTM A 276, Type 304.
- D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.
- E. Rolled-Stainless-Steel Floor Plate: ASTM A 793.
- F. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.
- G. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.
- H. Zinc-Coated Steel Wire Rope: ASTM A 741.
  - 1. Wire-Rope Fittings: Hot-dip galvanized-steel connectors with capability to sustain, without failure, a load equal to minimum breaking strength of wire rope with which they are used.
- I. Cast Iron: Either gray iron, ASTM A 48/A 48M, or malleable iron, ASTM A 47/A 47M, unless otherwise indicated.
- J. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063-T6.
- K. Aluminum-Alloy Rolled Tread Plate: ASTM B 632/B 632M, Alloy 6061-T6.
- L. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.
- M. Bronze Extrusions: ASTM B 455, Alloy UNS No. C38500 (extruded architectural bronze).
- N. Bronze Castings: ASTM B 584, Alloy UNS No. C83600 (leaded red brass) or No. C84400 (leaded semired brass).
- O. Nickel Silver Castings: ASTM B 584, Alloy UNS No. C97600 (20 percent leaded nickel bronze).

## 2.3 FASTENERS

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

3. Provide stainless-steel fasteners for fastening nickel silver.
  4. Provide bronze fasteners for fastening bronze.
- B. Cast-in-Place Anchors in Concrete: Either threaded type or wedge type unless otherwise indicated; galvanized ferrous castings, either ASTM A 47/A 47M malleable iron or ASTM A 27/A 27M cast steel. Provide bolts, washers, and shims as needed, all hot-dip galvanized per ASTM F 2329.
- C. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors.
1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.
  2. Material for Exterior Locations and Where Stainless Steel Is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

## 2.4 MISCELLANEOUS MATERIALS

- A. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
1. Use primer containing pigments that make it easily distinguishable from zinc-rich primer.
- B. Water-Based Primer: Emulsion type, anticorrosive primer for mildly corrosive environments that is resistant to flash rusting when applied to cleaned steel, complying with MPI#107 and compatible with topcoat.
- C. Epoxy Zinc-Rich Primer: Complying with MPI#20 and compatible with topcoat.
- D. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.
- E. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.
- F. Nonshrink, Nonmetallic Grout: Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M. Provide grout specifically recommended by manufacturer for interior and exterior applications.
- G. Concrete: Comply with requirements in Section 033000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength as indicated on the structural plans.

## 2.5 FABRICATION, GENERAL

- A. Shop Assembly: Preassemble items in the shop to greatest extent possible. Use connections that maintain structural value of joined pieces.
- B. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges. Remove sharp or rough areas on exposed surfaces.

- C. 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.
- D. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners or welds where possible. Locate joints where least conspicuous.
- E. Fabricate seams and other connections that are exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.
- F. Where units are indicated to be cast into concrete or built into masonry, equip with integrally welded steel strap anchors not less than 8 inches (200 mm) from ends and corners of units and 24 inches (600 mm) o.c.

## 2.6 MISCELLANEOUS FRAMING AND SUPPORTS

- A. General: Provide steel framing and supports not specified in other Sections as needed to complete the Work.
- B. Fabricate units from steel shapes, plates, and bars of welded construction unless otherwise indicated. Fabricate to sizes, shapes, and profiles indicated and as necessary to receive adjacent construction.
- C. Fabricate steel girders for wood frame construction from continuous steel shapes of sizes indicated.
  - 1. Where wood nailers are attached to girders with bolts or lag screws, drill or punch holes at 24 inches (600 mm) o.c.
- D. Fabricate steel pipe columns for supporting wood frame construction from steel pipe with steel baseplates and top plates as indicated. Drill or punch baseplates and top plates for anchor and connection bolts and weld to pipe with fillet welds all around. Make welds the same size as pipe wall thickness unless otherwise indicated.

## 2.7 SHELF ANGLES

- A. Fabricate shelf angles from steel angles of sizes indicated and for attachment to concrete framing. Provide horizontally slotted holes to receive 3/4-inch (19-mm) bolts, spaced not more than 6 inches (150 mm) from ends and 24 inches (600 mm) o.c., unless otherwise indicated.
- B. For cavity walls, provide vertical channel brackets to support angles from backup masonry and concrete.
- C. Galvanize shelf angles located in exterior walls.
- D. Prime shelf angles located in exterior walls with zinc-rich primer.

- E. Furnish wedge-type concrete inserts, complete with fasteners, to attach shelf angles to cast-in-place concrete.

## 2.8 MISCELLANEOUS STEEL TRIM

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

## 2.9 METAL BOLLARDS

- A. Fabricate metal bollards from Schedule 40 steel pipe.
- B. Prime bollards with zinc-rich primer.

## 2.10 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.

## 2.11 LOOSE STEEL LINTELS

- A. Fabricate loose steel lintels from steel angles and shapes of size indicated for openings and recesses in masonry walls and partitions at locations indicated.
- B. Galvanize loose steel lintels located in exterior walls.
- C. Prime loose steel lintels located in exterior walls with zinc-rich primer.

## 2.12 STEEL WELD PLATES AND ANGLES

- A. Provide steel weld plates and angles not specified in other Sections, for items supported from concrete construction as needed to complete the Work. Provide each unit with no fewer than two integrally welded steel strap anchors for embedding in concrete.

## 2.13 FINISHES, GENERAL

- A. Finish metal fabrications after assembly.

## 2.14 STEEL AND IRON FINISHES

- A. 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.
- B. Shop prime iron and steel items not indicated to be galvanized unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
  - 1. Shop prime with universal shop primer indicated.
- C. Preparation for Shop Priming: Prepare surfaces to comply with requirements indicated below:
  - 1. Exterior Items: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 2. Items Indicated to Receive Zinc-Rich Primer: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 3. Items Indicated to Receive Primers Specified in Section 099600 "High-Performance Coatings": SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
  - 4. Other Items: SSPC-SP 3, "Power Tool Cleaning."
- D. Shop Priming: Apply shop primer to comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

## PART 3 - EXECUTION

## 3.1 INSTALLATION, GENERAL

- A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal fabrications. Set metal fabrications accurately in location, alignment, and elevation; with edges and surfaces level, plumb, true, and free of rack; and measured from established lines and levels.
- B. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints but cannot be shop welded because of shipping size limitations. Do not weld, cut, or abrade surfaces of exterior units that have been hot-dip galvanized after fabrication and are for bolted or screwed field connections.
- C. Field Welding: Comply with the following requirements:
  - 1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
  - 2. Obtain fusion without undercut or overlap.
  - 3. Remove welding flux immediately.
  - 4. At exposed connections, finish exposed welds and surfaces smooth and blended so no roughness shows after finishing and contour of welded surface matches that of adjacent surface.
- D. Fastening to In-Place Construction: Provide anchorage devices and fasteners where metal fabrications are required to be fastened to in-place construction.

- E. Provide temporary bracing or anchors in formwork for items that are to be built into concrete, masonry, or similar construction.

### 3.2 INSTALLING METAL BOLLARDS

- A. Fill bollards solidly with concrete.
- B. Anchor bollards in concrete in formed or core-drilled holes. Fill annular space around bollard solidly with nonshrink grout.
- C. Anchor bollards in place with concrete footings. Place concrete and vibrate or tamp for consolidation. Support and brace bollards in position until concrete has cured.
- D. Fill bollards solidly with concrete, mounding top surface to shed water.

### 3.3 INSTALLING 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 wedges, shims, or leveling nuts. After bearing members have been positioned and plumbed, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with nonshrink grout. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

### 3.4 ADJUSTING AND CLEANING

- A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas. Paint uncoated and abraded areas with the same material as used for shop painting to comply with SSPC-PA 1 for touching up shop-painted surfaces.
- B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 05 5000

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**SECTION 05 51 00  
METAL STAIRS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Stairs with grating treads.
- B. Structural steel stair framing and supports.
- C. Handrails and guards.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Placement of metal anchors in concrete.
- B. Section 04 20 00 - Unit Masonry: Placement of metal fabrications in masonry.
- C. Section 09 91 23 - Interior Painting: Paint finish.

**1.03 REFERENCE STANDARDS**

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.
- C. ASTM A53/A53M - Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless 2020.
- D. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- E. ASTM A500/A500M - Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes 2021.
- F. ASTM A501/A501M - Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing 2014.
- G. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength 2019, with Editorial Revision (2020).
- H. AWS A2.4 - Standard Symbols for Welding, Brazing, and Nondestructive Examination 2012.
- I. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2014 (Amended 2015).
- J. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
- K. NAAMM AMP 510 - Metal Stairs Manual 1992.
- L. NAAMM MBG 531 - Metal Bar Grating Manual 2017.
- M. NAAMM MBG 532 - Heavy Duty Metal Bar Grating Manual 2009.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate profiles, sizes, connection attachments, reinforcing, anchorage, size and type of fasteners, and accessories.
  - 1. Indicate welded connections using standard AWS A2.4 welding symbols. Indicate net weld lengths.
  - 2. Include the design engineer's seal and signature on each sheet of shop drawings.
- C. Design Data: As required by authorities having jurisdiction.
- D. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.



## 1.05 QUALITY ASSURANCE

- A. Structural Designer Qualifications: Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located, or personnel under direct supervision of such an engineer.
- B. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and dated no more than 12 months before start of scheduled welding work.
- C. Fabricator Qualifications:
  - 1. A company specializing in manufacturing products specified in this section, with not less than ten years of documented experience.

## PART 2 PRODUCTS

### 2.01 METAL STAIRS - GENERAL

- A. Metal Stairs: Provide stairs of the design specified, complete with landing platforms, vertical and horizontal supports, railings, and guards, fabricated accurately for anchorage to each other and to building structure.
  - 1. Regulatory Requirements: Provide stairs and railings that comply with most stringent requirements of local, state, and federal regulations; where requirements of Contract Documents exceed those of regulations, comply with Contract Documents.
  - 2. Handrails: Comply with applicable accessibility requirements of ADA Standards.
  - 3. Structural Design: Provide complete stair and railing assemblies that comply with the applicable local code.
  - 4. Dimensions: As indicated on drawings.
  - 5. Shop assemble components; disassemble into largest practical sections suitable for transport and access to site.
  - 6. No sharp or rough areas on exposed travel surfaces and surfaces accessible to touch.
  - 7. Separate dissimilar metals using paint or permanent tape.
- B. Metal Jointing and Finish Quality Levels:
  - 1. Industrial: All joints made neatly.
    - a. Welded Joints: Welded on back side wherever possible.
    - b. Welds Exposed to Touch: Ground smooth.
    - c. Bolts Exposed to Touch in Travel Area: No nuts or screw threads exposed to touch.
- C. Fasteners: Same material or compatible with materials being fastened; type consistent with design and specified quality level.
- D. Anchors and Related Components: Same material and finish as item to be anchored, except where specifically indicated otherwise; provide all anchors and fasteners required.

### 2.02 METAL STAIRS WITH GRATING TREADS

- A. Jointing and Finish Quality Level: Industrial, as defined above.
- B. Risers: Closed.
- C. Treads: Steel bar grating.
  - 1. Grating Type: Pressure locked.
  - 2. Bearing Bar Depth: 3/4 inch, minimum.
  - 3. Top Surface: Standard.
  - 4. Nosing: Checkered plate.
  - 5. Nosing Width: 1-1/4 inch, minimum.
  - 6. Anchorage to Stringers: End plates welded to grating, bolted to stringers.
- D. Stringers: Rolled steel channels.
  - 1. Stringer Depth: As indicated on drawings.
  - 2. End Closure: Sheet steel, 14 gauge, 0.075 inch minimum; welded across ends.

- E. Landings: Same construction as treads, supported and reinforced as required to achieve design load capacity.
- F. Railings: Steel pipe railings.
- G. Finish: Shop- or factory-prime painted.

### **2.03 HANDRAILS AND GUARDS**

- A. Wall-Mounted Rails: Round pipe or tube rails unless otherwise indicated.
  - 1. Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.
- B. Guards:
  - 1. Top Rails: Round pipe or tube rails unless otherwise indicated.
    - a. Outside Diameter: 1-1/4 inch, minimum, to 1-1/2 inches, maximum.
  - 2. Infill at Pipe Railings: Woven wire mesh panels.
    - a. Material and Finish: Same as stair.
    - b. Wire Size: 0.135 inch.
    - c. Wire Spacing: 2 inch.
    - d. Mounting: Mesh welded to steel bar frame, frame welded to posts.
  - 3. End and Intermediate Posts: Same material and size as top rails.
    - a. Horizontal Spacing: As indicated on drawings.
    - b. Mounting: Welded to top surface of stringer.

### **2.04 MATERIALS**

- A. Steel Sections: ASTM A36/A36M.
- B. Steel Tubing: ASTM A500/A500M or ASTM A501/A501M structural tubing, round and shapes as indicated.
- C. Pipe: ASTM A53/A53M Grade B Schedule 40, black finish.
- D. Gratings: Bar gratings that comply with NAAMM MBG 531 or NAAMM MBG 532, whichever applies based on bar sizes.

### **2.05 ACCESSORIES**

- A. Steel Bolts, Nuts, and Washers: ASTM F3125/F3125M, Type 1, and galvanized to ASTM A153/A153M where connecting galvanized components.
- B. Welding Materials: AWS D1.1/D1.1M; type required for materials being welded.

### **2.06 SHOP FINISHING**

- A. Clean surfaces of rust, scale, grease, and foreign matter prior to finishing.
- B. Do not prime surfaces in direct contact with concrete or where field welding is required.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that field conditions are acceptable and are ready to receive work.

### **3.02 PREPARATION**

- A. When field welding is required, clean and strip primed steel items to bare metal.
- B. Supply items required to be cast into concrete and embedded in masonry with setting templates.

### **3.03 INSTALLATION**

- A. Install components plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers, and struts required for connecting stairs to structure.
- C. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.

- D. Provide welded field joints where specifically indicated on shop drawings. Perform field welding in accordance with AWS D1.1/D1.1M.
- E. Other field joints may be either welded or bolted provided the result complies with the limitations specified for jointing quality levels.
- F. Obtain approval prior to site cutting or creating adjustments not scheduled.
- G. After erection, prime welds, abrasions, and surfaces not shop primed or galvanized, except surfaces to be in contact with concrete.

**3.04 TOLERANCES**

- A. Maximum Variation From Plumb: 1/4 inch per story, non-cumulative.
- B. Maximum Offset From True Alignment: 1/4 inch.

**END OF SECTION**

## SECTION 06 1000 - ROUGH CARPENTRY

## PART 1 - GENERAL

## 1.1 SUMMARY

- A. This Section includes the following:
  - 1. Framing with dimension lumber.
  - 2. Framing with engineered wood products.
  - 3. Rooftop equipment bases and support curbs.
  - 4. Wood blocking, cants, and nailers.
  - 5. Wood furring and grounds.
  - 6. Wood sleepers.
  - 7. Plywood backing panels.

## 1.2 DEFINITIONS

- A. Exposed Framing: Framing not concealed by other construction.
- B. Dimension Lumber: Lumber of 2 inches nominal or greater but less than 5 inches nominal in least dimension.
- C. Lumber grading agencies, and the abbreviations used to reference them, include the following:
  - 1. NeLMA: Northeastern Lumber Manufacturers' Association.
  - 2. NLGA: National Lumber Grades Authority.
  - 3. RIS: Redwood Inspection Service.
  - 4. SPIB: The Southern Pine Inspection Bureau.
  - 5. WCLIB: West Coast Lumber Inspection Bureau.
  - 6. WWPA: Western Wood Products Association.

## 1.3 SUBMITTALS

- A. Product Data: For each type of process and factory-fabricated product. Indicate component materials and dimensions and include construction and application details.
  - 1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated materials comply with requirements. Indicate type of preservative used and net amount of preservative retained.
  - 2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
  - 3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

- B. Material Certificates: For dimension lumber specified to comply with minimum allowable unit stresses. Indicate species and grade selected for each use and design values approved by the ALSC Board of Review.
- C. Research/Evaluation Reports: For the following, showing compliance with building code in effect for Project:
  - 1. Wood-preservative-treated wood.
  - 2. Fire-retardant-treated wood.
  - 3. Engineered wood products.
  - 4. Power-driven fasteners.
  - 5. Powder-actuated fasteners.
  - 6. Expansion anchors.
  - 7. Metal framing anchors.

#### 1.4 QUALITY ASSURANCE

- A. Source Limitations for Engineered Wood Products: Obtain each type of engineered wood product through one source from a single manufacturer.

#### 1.5 DELIVERY, STORAGE, AND HANDLING

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

### PART 2 - PRODUCTS

#### 2.1 WOOD PRODUCTS, GENERAL

- A. Lumber: DOC PS 20 and applicable rules of grading agencies indicated. If no grading agency is indicated, provide lumber that complies with the applicable rules of any rules-writing agency certified by the ALSC Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Factory mark each piece of lumber with grade stamp of grading agency.
  - 2. For exposed lumber indicated to receive a stained or natural finish, mark grade stamp on end or back of each piece or omit grade stamp and provide certificates of grade compliance issued by grading agency.
  - 3. Where nominal sizes are indicated, provide actual sizes required by DOC PS 20 for moisture content specified. Where actual sizes are indicated, they are minimum dressed sizes for dry lumber.
  - 4. Provide dressed lumber, S4S, unless otherwise indicated.
- B. Engineered Wood Products: Provide engineered wood products acceptable to authorities having jurisdiction and for which current model code research or evaluation reports exist that show compliance with building code in effect for Project.

1. Allowable Design Stresses: Provide engineered wood products with allowable design stresses, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.

## 2.2 WOOD-PRESERVATIVE-TREATED LUMBER

- A. Preservative Treatment by Pressure Process: AWWPA C2, except that lumber that is not in contact with the ground and is continuously protected from liquid water may be treated according to AWWPA C31 with inorganic boron (SBX).
  1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.
  2. For exposed items indicated to receive a stained or natural finish, use chemical formulations that do not require incising, contain colorants, bleed through, or otherwise adversely affect finishes.
- B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or does not comply with requirements for untreated material.
- C. Mark lumber with treatment quality mark of an inspection agency approved by the ALSC Board of Review.
- D. Application: Treat items indicated on Drawings, and the following:
  1. Wood cants, nailers, curbs, equipment support bases, blocking, stripping, and similar members in connection with roofing, flashing, vapor barriers, and waterproofing.
  2. Wood sills, sleepers, blocking, furring, and similar concealed members in contact with masonry or concrete.
  3. Wood framing and furring attached directly to the interior of below-grade exterior masonry or concrete walls.
  4. Wood framing members that are less than 18 inches above the ground in crawlspaces or unexcavated areas.
  5. Wood floor plates that are installed over concrete slabs-on-grade.

## 2.3 DIMENSION LUMBER FRAMING

- A. Maximum Moisture Content: 15 percent for 2-inch nominal thickness or less, 19 percent for more than 2-inch nominal.
- B. Non-Load-Bearing Interior Partitions: Construction or No. 2 grade of any species.
- C. Framing Other Than Non-Load-Bearing Interior Partitions: Construction, Stud, or No. 3 grade and any of the following species:
  1. Hem-fir (north); NLGA.
  2. Douglas fir-larch; WCLIB or WWPA.
  3. Spruce-pine-fir; NLGA.

- D. Ceiling Joists (Non-Load-Bearing): Construction or No. 2 grade of any of the following species:
1. Hem-fir (north); NLGA.
  2. Southern pine; SPIB.
  3. Douglas fir-larch; WCLIB or WWPA.
  4. Douglas fir-larch (north); NLGA.
  5. Mixed southern pine; SPIB.
  6. Spruce-pine-fir; NLGA.
  7. Hem-fir; WCLIB or WWPA.
  8. Douglas fir-south; WWPA.
  9. Spruce-pine-fir (south); NeLMA, WCLIB, or WWPA.
- E. Joists, Rafters, and Other Framing Not Listed Above: Select Structural No. 1 or No. 2 grade and any of the following species:
1. Hem-fir (north); NLGA.
  2. Douglas fir-larch; WCLIB or WWPA.

## 2.4 ENGINEERED WOOD PRODUCTS

- A. Laminated-Veneer Lumber: Structural composite lumber made from wood veneers with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559 and containing no urea formaldehyde.
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. Boise Cascade Corporation.
    - b. Finnforest USA.
    - c. Georgia-Pacific.
    - d. Louisiana-Pacific Corporation.
    - e. Pacific Woodtech Corporation.
    - f. Roseburg Forest Products Co.
    - g. Weldwood of Canada Limited; Subsidiary of International Paper Corporation.
    - h. Weyerhaeuser Company.
- B. Parallel-Strand Lumber: Structural composite lumber made from wood strand elements with grain primarily parallel to member lengths, evaluated and monitored according to ASTM D 5456 and manufactured with an exterior-type adhesive complying with ASTM D 2559 and containing no urea formaldehyde.
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:
  2. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Weyerhaeuser Company.

3. Extreme Fiber Stress in Bending, Edgewise: 2900 psi for 12-inch nominal- (286-mm actual-) depth members.
4. Modulus of Elasticity, Edgewise: 2,200,000 psi.

## 2.5 MISCELLANEOUS LUMBER

- A. General: Provide miscellaneous lumber indicated and lumber for support or attachment of other construction, including the following:
1. Blocking.
  2. Nailers.
  3. Rooftop equipment bases and support curbs.
  4. Cants.
  5. Furring.
  6. Grounds.
- B. For items of dimension lumber size, provide Standard, Stud, or No. 3 grade lumber with 15 percent maximum moisture content of any species.
- C. 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.
- D. 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.
- E. For furring strips for installing plywood or hardboard paneling, select boards with no knots capable of producing bent-over nails and damage to paneling.

## 2.6 PLYWOOD BACKING PANELS

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

## 2.7 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this Article for material and manufacture.
1. Where rough carpentry is exposed to weather, in ground contact, pressure-preservative treated, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.



- D. Wood Screws: ASME B18.6.1.
- E. Lag Bolts: ASME B18.2.1.
- F. Bolts: Steel bolts complying with ASTM A 307, Grade A; with ASTM A 563 hex nuts and, where indicated, flat washers.
- G. 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.

## 2.8 METAL FRAMING ANCHORS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
  - 1. Alpine Engineered Products, Inc.
  - 2. Cleveland Steel Specialty Co.
  - 3. Harlen Metal Products, Inc.
  - 4. KC Metals Products, Inc.
  - 5. Simpson Strong-Tie Co., Inc.
  - 6. Southeastern Metals Manufacturing Co., Inc.
  - 7. USP Structural Connectors.
- B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency.
- C. Galvanized Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 coating designation.
  - 1. Use for interior locations where stainless steel is not indicated.
- D. Joist Hangers: U-shaped joist hangers with 2-inch-long seat and 1-1/4-inch-wide nailing flanges at least 85 percent of joist depth.
- E. I-Joist Hangers: U-shaped joist hangers with 2-inch-long seat and 1-1/4-inch-wide nailing flanges full depth of joist. Nailing flanges provide lateral support at joist top chord.
- F. Top Flange Hangers: U-shaped joist hangers, full depth of joist, formed from metal strap with tabs bent to extend over and be fastened to supporting member.
- G. Bridging: Rigid, V-section, nailless type, 0.050 inch thick, length to suit joist size and spacing.

- H. Post Bases: Adjustable-socket type for bolting in place with standoff plate to raise post 1 inch above base and with 2-inch- minimum side cover, socket 0.062 inch thick, and standoff and adjustment plates 0.108 inch thick.
- I. Joist Ties: Flat straps, with holes for fasteners, for tying joists together over supports.
- J. Rafter Tie-Downs: Bent strap tie for fastening rafters or roof trusses to wall studs below, 1-1/2 inches wide by 0.050 inch thick. Tie fastens to side of rafter or truss, face of top plates, and side of stud below.
- K. Rafter Tie-Downs (Hurricane or Seismic Ties): Bent strap tie for fastening rafters or roof trusses to wall studs below, 2-1/4 inches wide by 0.062 inch thick. Tie fits over top of rafter or truss and fastens to both sides of rafter or truss, face of top plates, and side of stud below.
- L. Floor-to-Floor Ties: Flat straps, with holes for fasteners, for tying upper floor wall studs to band joists and lower floor studs, 1-1/4 inches wide by 0.050 inch thick by 36 inches long.
- M. Hold-Downs: Brackets for bolting to wall studs and securing to foundation walls with anchor bolts or to other hold-downs with threaded rods and designed with first of two bolts placed seven bolt diameters from reinforced base.
- N. Wall Bracing: T-shaped bracing made for letting into studs in saw kerf, 1-1/8 inches wide by 9/16 inch deep by 0.034 inch thick with hemmed edges.

## 2.9 MISCELLANEOUS MATERIALS

- A. Sill-Sealer Gaskets: Glass-fiber-resilient insulation, fabricated in strip form, for use as a sill sealer; 1-inch nominal thickness, compressible to 1/32 inch; selected from manufacturer's standard widths to suit width of sill members indicated, or, Closed-cell neoprene foam, 1/4 inch thick, selected from manufacturer's standard widths to suit width of sill members indicated..
- B. Adhesives for Gluing Furring and Sleepers to Concrete or Masonry: Formulation complying with ASTM D 3498 that is approved for use indicated by adhesive manufacturer.
  - 1. Use adhesives that have a VOC content of 70g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- C. Water-Repellent Preservative: NWWDA-tested and -accepted formulation containing 3-iodo-2-propynyl butyl carbamate, combined with an insecticide containing chlorpyrifos as its active ingredient.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Set rough carpentry to required levels and lines, with members plumb, true to line, cut, and fitted. Fit rough carpentry to other construction; scribe and cope as needed for accurate fit. Locate furring, nailers, blocking and similar supports to comply with requirements for attaching other construction.

- B. Framing Standard: Comply with AF&PA's "Details for Conventional Wood Frame Construction," unless otherwise indicated.
- C. Framing with Engineered Wood Products: Install engineered wood products to comply with manufacturer's written instructions.
- D. Metal Framing Anchors: Install metal framing to comply with manufacturer's written instructions.
- E. Do not splice structural members between supports, unless otherwise indicated.
- F. Provide blocking and framing as indicated and as required to support facing materials, fixtures, specialty items, and trim.
  - 1. Provide metal clips for fastening gypsum board or lath at corners and intersections where framing or blocking does not provide a surface for fastening edges of panels. Space clips not more than 16 inches o.c.
- G. Provide fire blocking in furred spaces, stud spaces, and other concealed cavities as indicated and as follows:
  - 1. Fire block furred spaces of walls, at each floor level, at ceiling, and at not more than 96 inches o.c. with solid wood blocking or noncombustible materials accurately fitted to close furred spaces.
  - 2. Fire block concealed spaces of wood-framed walls and partitions at each floor level, at ceiling line of top story, and at not more than 96 inches o.c. Where fire blocking is not inherent in framing system used, provide closely fitted solid wood blocks of same width as framing members and 2-inch nominal-thickness.
  - 3. Fire block concealed spaces between floor sleepers with same material as sleepers to limit concealed spaces to not more than 100 sq. ft. and to solidly fill space below partitions.
  - 4. Fire block concealed spaces behind combustible cornices and exterior trim at not more than 20 feet o.c.
- H. Sort and select lumber so that natural characteristics will not interfere with installation or with fastening other materials to lumber. Do not use materials with defects that interfere with function of member or pieces that are too small to use with minimum number of joints or optimum joint arrangement.
- I. Comply with AWWA M4 for applying field treatment to cut surfaces of preservative-treated lumber.
  - 1. Use inorganic boron for items that are continuously protected from liquid water.
  - 2. Use copper naphthenate for items not continuously protected from liquid water.
- J. Securely attach rough carpentry work to substrate by anchoring and fastening as indicated, complying with the following:
  - 1. NES NER-272 for power-driven fasteners.
  - 2. Table 2304.9.1, "Fastening Schedule," in ICC's International Building Code.

3. Table 23-II-B-1, "Nailing Schedule," and Table 23-II-B-2, "Wood Structural Panel Roof Sheathing Nailing Schedule," in ICBO's Uniform Building Code.
4. Table 2305.2, "Fastening Schedule," in BOCA's BOCA National Building Code.
5. Table 2306.1, "Fastening Schedule," in SBCCI's Standard Building Code.
6. Table R602.3(1), "Fastener Schedule for Structural Members," and Table R602.3(2), "Alternate Attachments," in ICC's International Residential Code for One- and Two-Family Dwellings.
7. Table 602.3(1), "Fastener Schedule for Structural Members," and Table 602.3(2), "Alternate Attachments," in ICC's International One- and Two-Family Dwelling Code.

- K. Use common wire nails, unless otherwise indicated. Select fasteners of size that will not fully penetrate members where opposite side will be exposed to view or will receive finish materials. Make tight connections between members. Install fasteners without splitting wood; do not countersink nail heads, unless otherwise indicated.
- L. For exposed work, arrange fasteners in straight rows parallel with edges of members, with fasteners evenly spaced, and with adjacent rows staggered.

### 3.2 WOOD GROUND, SLEEPER, BLOCKING, AND NAILER INSTALLATION

- A. Install where indicated and where required for attaching other work. Form to shapes indicated and cut as required for true line and level of attached work. Coordinate locations with other work involved.
- B. Attach items to substrates to support applied loading. Recess bolts and nuts flush with surfaces, unless otherwise indicated.
- C. Where wood-preserved-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.
- D. Provide permanent grounds of dressed, pressure-preserved-treated, key-beveled lumber not less than 1-1/2 inches wide and of thickness required to bring face of ground to exact thickness of finish material. Remove temporary grounds when no longer required.

### 3.3 WOOD FURRING INSTALLATION

- A. Install level and plumb with closure strips at edges and openings. Shim with wood as required for tolerance of finish work.
- B. Furring to Receive Plywood or Hardboard Paneling: Install 1-by-3-inch nominal-size furring vertically at 24 inches o.c.
- C. Furring to Receive Gypsum Board: Install 1-by-2-inch nominal-size furring vertically at 16 inches o.c.

### 3.4 WALL AND PARTITION FRAMING INSTALLATION

- A. General: Provide single bottom plate and double top plates using members of 2-inch nominal thickness whose widths equal that of studs, except single top plate may be used for non-load-

bearing partitions and for load-bearing partitions where framing members bearing on partition are located directly over studs. Fasten plates to supporting construction, unless otherwise indicated.

1. Provide continuous horizontal blocking at midheight of partitions more than 96 inches high, using members of 2-inch nominal thickness and of same width as wall or partitions.
- B. Construct corners and intersections with three or more studs, except that two studs may be used for interior non-load-bearing partitions.
- C. Frame openings with multiple studs and headers. Provide nailed header members of thickness equal to width of studs. Support headers on jamb studs.
1. For non-load-bearing partitions, provide double-jamb studs and headers not less than 4-inch nominal depth for openings 48 inches and less in width, 6-inch nominal depth for openings 48 to 72 inches in width, 8-inch nominal depth for openings 72 to 120 inches in width, and not less than 10-inch nominal depth for openings 10 to 12 feet in width.
  2. For load-bearing walls, provide double-jamb studs for openings 60 inches and less in width, and triple-jamb studs for wider openings. Provide headers of depth indicated or, if not indicated, according to Table R502.5(1) or Table R502.5(2), as applicable, in ICC's International Residential Code for One- and Two-Family Dwellings.
- D. Provide diagonal bracing in exterior walls, at locations indicated, at 45-degree angle, full-story height, unless otherwise indicated. Use metal wall bracing, let into studs in saw kerf.

### 3.5 CEILING JOIST AND RAFTER FRAMING INSTALLATION

- A. Ceiling Joists: Install ceiling joists with crown edge up and complying with requirements specified above for floor joists. Face nail to ends of parallel rafters.
1. Where ceiling joists are at right angles to rafters, provide additional short joists parallel to rafters from wall plate to first joist; nail to ends of rafters and to top plate and nail to first joist or anchor with framing anchors or metal straps. Provide 1-by-8-inch nominal-size or 2-by-4-inch nominal-size stringers spaced 48 inches o.c. crosswise over main ceiling joists.
- B. Rafters: Notch to fit exterior wall plates and use metal framing anchors. Double rafters to form headers and trimmers at openings in roof framing, if any, and support with metal hangers. Where rafters abut at ridge, place directly opposite each other and nail to ridge member or use metal ridge hangers.
1. At valleys, provide double-valley rafters of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against valley rafters.
  2. At hips, provide hip rafter of size indicated or, if not indicated, of same thickness as regular rafters and 2 inches deeper. Bevel ends of jack rafters for full bearing against hip rafter.
- C. Provide collar beams (ties) as indicated or, if not indicated, provide 1-by-6-inch nominal-size boards between every third pair of rafters, but not more than 48 inches o.c. Locate below ridge member, at third point of rafter span. Cut ends to fit roof slope and nail to rafters.

- D. Provide special framing as indicated for eaves, overhangs, dormers, and similar conditions, if any.

### 3.6 PROTECTION

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

END OF SECTION 06 1000

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## SECTION 06 1600 - SHEATHING

## PART 1 - GENERAL

## 1.1 SUMMARY

## A. Section Includes:

1. Wall sheathing.

## 1.2 ACTION SUBMITTALS

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

1. Include data for wood-preservative treatment from chemical treatment manufacturer and certification by treating plant that treated plywood complies with requirements. Indicate type of preservative used and net amount of preservative retained.
2. For products receiving a waterborne treatment, include statement that moisture content of treated materials was reduced to levels specified before shipment to Project site.
3. Include copies of warranties from chemical treatment manufacturers for each type of treatment.

## 1.3 QUALITY ASSURANCE

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

## 1.4 DELIVERY, STORAGE, AND HANDLING

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

## PART 2 - PRODUCTS

## 2.1 WOOD PANEL PRODUCTS

- A. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.
- B. Thickness: As needed to comply with requirements specified, but not less than thickness indicated.



- C. Factory mark panels to indicate compliance with applicable standard.

## 2.2 WALL SHEATHING

- A. Plywood Wall Sheathing: Either DOC PS 1 or DOC PS 2, Exposure 1 sheathing.

## 2.3 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. For wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.
- C. Power-Driven Fasteners: NES NER-272.
- D. Wood Screws: ASME B18.6.1.
- E. Screws for Fastening Wood Structural Panels to Cold-Formed Metal Framing: ASTM C 954, except with wafer heads and reamer wings, length as recommended by screw manufacturer for material being fastened.
  - 1. For wall sheathing panels, provide screws with organic-polymer or other corrosion-protective coating having a salt-spray resistance of more than 800 hours according to ASTM B 117.

## PART 3 - EXECUTION

### 3.1 INSTALLATION, GENERAL

- A. Do not use materials with defects that impair quality of sheathing or pieces that are too small to use with minimum number of joints or optimum joint arrangement. Arrange joints so that pieces do not span between fewer than three support members.
- B. Cut panels at penetrations, edges, and other obstructions of work; fit tightly against abutting construction unless otherwise indicated.
- C. Securely attach to substrate by fastening as indicated, complying with the following:
  - 1. NES NER-272 for power-driven fasteners.
  - 2. Table 2304.9.1, "Fastening Schedule," in ICC's "International Building Code."
- D. Coordinate wall sheathing installation with flashing and joint-sealant installation so these materials are installed in sequence and manner that prevent exterior moisture from passing through completed assembly.

- E. Do not bridge building expansion joints; cut and space edges of panels to match spacing of structural support elements.
- F. Coordinate sheathing installation with installation of materials installed over sheathing so sheathing is not exposed to precipitation or left exposed at end of the workday when rain is forecast.

### 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. Wall Sheathing:
    - a. Nail to wood framing.
    - b. Space panels 1/8 inch (3 mm) apart at edges and ends.

END OF SECTION 06 1600

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**SECTION 06 1733  
WOOD I-JOISTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wood I-joists for roof and floor framing.
- B. Bridging, bracing, and anchorage.
- C. Framing for openings.
- D. Preservative treatment of wood.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 6116 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 06 1000 - Rough Carpentry: Installation requirements for miscellaneous framing.
- C. Section 06 1000 - Rough Carpentry: Material requirements for blocking, plates, and miscellaneous framing.

**1.03 REFERENCE STANDARDS**

- A. ASTM D2559 - Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions 2012a (Reapproved 2018).
- B. ASTM D5055 - Standard Specification for Establishing and Monitoring Structural Capacities of Prefabricated Wood I-Joists 2019, with Editorial Revision (2020).
- C. AWPA U1 - Use Category System: User Specification for Treated Wood 2018.
- D. PS 1 - Structural Plywood 2009.
- E. PS 2 - Performance Standard for Wood-Based Structural-Use Panels 2010.

**1.04 DESIGN REQUIREMENTS**

- A. Design Floor Live and Dead Load: See Plans - with deflection limited to 1/480 of span.
- B. Design Roof Live and Dead Load: See Plans - with deflection limited to 1/240 of span.

**1.05 SUBMITTALS**

- A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's literature describing materials, dimensions, allowable spans and spacings, bearing and anchor details, bridging and bracing requirements, and installation instructions; identify independent inspection agency.
- C. Shop Drawings: Indicate sizes and spacing of joists, bracing and bridging, bearing stiffeners, holes to be cut (if any), and framed openings between joists.
- D. Certificate: Certification by joist manufacturer that products delivered are of the same design and construction as those evaluated by the independent inspection agency.

**1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of documented experience.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver products to site in manufacturer's original packaging with manufacturer's name and product identification intact and legible.
- B. Protect products from damage due to weather and breakage.
- C. Protect joists from warping or other distortion by stacking in upright position, braced to resist movement, with air circulation under coverings and around stacks.

- D. Handle individual joists in the upright position.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Wood I-Joists:
  1. Boise Cascade Company; [www.bc.com/#sle](http://www.bc.com/#sle).
  2. Louisiana-Pacific Corporation; [www.lpcorp.com/#sle](http://www.lpcorp.com/#sle).
  3. RedBuilt LLC; Redbuilt I-Joist: [www.redbuilt.com/#sle](http://www.redbuilt.com/#sle).
  4. Weyerhaeuser Company; [www.weyerhaeuser.com/#sle](http://www.weyerhaeuser.com/#sle).
  5. Substitutions: See Section 01 6000 - Product Requirements.

**2.02 MATERIALS**

- A. Wood I-Joists: Solid lumber top and bottom flanges and oriented strand board (OSB) webs bonded together with structural adhesive, with published span rating to meet project requirements.
  1. Span Rating: Established and monitored in accordance with ASTM D5055 by independent inspection agency.
  2. Oriented Strand Board: Comply with PS 2.
  3. Plywood: Comply with PS 1.
  4. Adhesive: Tested for wet/exterior service in accordance with ASTM D2559.
  5. Depth: As indicated on drawings.
  6. Depth: 9-1/2 inches (241 mm).
  7. Fabrication Tolerances:
    - a. Flange Width: Plus/minus 1/32 inch (0.8 mm).
    - b. Flange Thickness: Minus 1/16 inch (1.6 mm).
    - c. Joist Depth: Plus 0, minus 1/8 inch (3.2 mm).
  8. Marking: Mark each piece with depth, joist spacing, and allowable span for joist spacing.
  9. Provide bearing stiffeners if required by span rating or joist hanger manufacturer.
- B. Wood-Based Components:
  1. Wood fabricated from old growth timber is not permitted.
  2. Provide sustainably harvested wood, certified or labeled as specified in Section 01 6000.
  3. Provide wood harvested within a 500 mile (805 km) radius of the project site.
  4. Wood fabricated from timber recovered from riverbeds or otherwise abandoned is permitted, unless otherwise noted, provided it is clean and free of contamination; identify source; provide lumber re-graded by an inspection service accredited by the American Lumber Standard Committee, Inc.
- C. Joist Hangers: Simpson Strong-Tie or equal.
- D. Joist Bridging: Type, size and spacing recommended by joist manufacturer.
- E. Wood Blocking, Plates, and Miscellaneous Framing: Softwood lumber, any species, construction grade, maximum moisture content of 19 percent.
- F. Wood Blocking, Plates, and Miscellaneous Framing: As specified in Section 06 1000.
- G. Fasteners: Electrogalvanized steel, type to suit application.
- H. Bearing Plates: Electrogalvanized steel, unfinished.

**2.03 WOOD TREATMENT**

- A. Factory-Treated Lumber and Plywood: Comply with requirements of AWPA U1 - Use Category System for wood treatments determined by use categories, expected service conditions, and specific applications.

**PART 3 EXECUTION****3.01 EXAMINATION**

- A. Verify that supports and openings are ready to receive joists.
- B. Verify that field measurements are as indicated on shop drawings.

**3.02 PREPARATION**

- A. Coordinate placement of bearing items.

**3.03 ERECTION**

- A. Install joists in accordance with manufacturer's instructions.
- B. Set structural members level and plumb, in correct position.
- C. Make provisions for erection loads and for sufficient temporary bracing to maintain structure plumb and in true alignment until completion of erection and installation of permanent bracing.
- D. Do not field cut or alter structural members without approval of Architect.
- E. Install permanent bridging and bracing.
- F. Install headers and supports to frame openings required.
- G. Frame openings between joists with lumber in accordance with Section 06 1000.
- H. Coordinate installation of sheathing/decking with work of this section.

**3.04 SITE APPLIED WOOD TREATMENT**

- A. Apply preservative treatment in accordance with manufacturer's instructions.
- B. Brush apply one coat of preservative treatment on wood in contact with cementitious materials and roofing and related metal flashings. Treat site-sawn cuts.
- C. Allow preservative to dry prior to erecting members.

**3.05 TOLERANCES**

- A. Framing Members: 1/2 inch (12 mm) maximum, from true position.

**END OF SECTION**

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## SECTION 06 1753 - SHOP-FABRICATED WOOD TRUSSES

## PART 1 - GENERAL

## 1.1 SUMMARY

## A. Section Includes:

1. Wood roof trusses.

## 1.2 ACTION SUBMITTALS

## A. Product Data: For metal-plate connectors, metal truss accessories, and fasteners.

## B. Shop Drawings: Show fabrication and installation details for trusses.

1. Show location, pitch, span, camber, configuration, and spacing for each type of truss required.
2. Indicate sizes, stress grades, and species of lumber.
3. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
4. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
5. Show splice details and bearing details.

## C. Delegated-Design Submittal: For metal-plate-connected wood trusses indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

## 1.3 QUALITY ASSURANCE

## A. Metal Connector-Plate Manufacturer Qualifications: A manufacturer that is a member of TPI and that complies with quality-control procedures in TPI 1 for manufacture of connector plates.

1. Manufacturer's responsibilities include providing professional engineering services needed to assume engineering responsibility.
2. Engineering Responsibility: Preparation of Shop Drawings and comprehensive engineering analysis by a qualified professional engineer.

## B. Fabricator Qualifications: Shop that participates in a recognized quality-assurance program, complies with quality-control procedures in TPI 1, and involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.



#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Handle and store trusses to comply with recommendations in SBCA BCSI, "Building Component Safety Information: Guide to Good Practice for Handling, Installing, Restraining, & Bracing Metal Plate Connected Wood Trusses."

### PART 2 - PRODUCTS

#### 2.1 PERFORMANCE REQUIREMENTS

- A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design metal-plate-connected wood trusses.
- B. Structural Performance: Metal-plate-connected wood trusses shall be capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1.
- C. Comply with applicable requirements and recommendations of TPI 1-2002, TPI DSB-1989, and SBCA BCSI-2013.
- D. Wood Structural Design Standard: Comply with applicable requirements in AF&PA's "National Design Specifications for Wood Construction" and its "Supplement."

#### 2.2 DIMENSION LUMBER

- A. Lumber: DOC PS 20 and applicable rules of any rules-writing agency certified by the American Lumber Standard Committee (ALSC) Board of Review. Provide lumber graded by an agency certified by the ALSC Board of Review to inspect and grade lumber under the rules indicated.
  - 1. Provide dry lumber with 15 percent maximum moisture content at time of dressing.
- B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 061000 "Rough Carpentry."

#### 2.3 METAL CONNECTOR PLATES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. Alpine Engineered Products, Inc.; a division of ITW Building Components Group, Inc.
  - 2. Cherokee Metal Products, Inc.; Masengill Machinery Company.
  - 3. CompuTrus, Inc.
  - 4. Eagle Metal Products.
  - 5. Jager Building Systems, Inc.
  - 6. MiTek Industries, Inc.
  - 7. Robbins Engineering, Inc.
  - 8. Truswal Systems Corporation.
- B. General: Fabricate connector plates to comply with TPI 1.

- C. Hot-Dip Galvanized-Steel Sheet: ASTM A 653/A 653M; Structural Steel (SS), high-strength low-alloy steel Type A (HSLAS Type A), or high-strength low-alloy steel Type B (HSLAS Type B); G60 (Z180) coating designation; and not less than 0.036 inch (0.9 mm) thick.

## 2.4 FASTENERS

- A. General: Provide fasteners of size and type indicated that comply with requirements specified in this article for material and manufacture.
  - 1. Provide fasteners for use with metal framing anchors that comply with written recommendations of metal framing manufacturer.
  - 2. Where trusses are exposed to weather, in ground contact, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M.
- B. Nails, Brads, and Staples: ASTM F 1667.

## 2.5 METAL FRAMING ANCHORS AND ACCESSORIES

- A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
  - 1. KC Metals Products, Inc.
  - 2. Simpson Strong-Tie Co., Inc.
  - 3. USP Structural Connectors.
- B. Allowable design loads, as published by manufacturer, shall comply with or exceed those indicated. Manufacturer's published values shall be determined from empirical data or by rational engineering analysis and demonstrated by comprehensive testing performed by a qualified independent testing agency. Framing anchors shall be punched for fasteners adequate to withstand same loads as framing anchors.
- C. Galvanized-Steel Sheet: Hot-dip, zinc-coated steel sheet complying with ASTM A 653/A 653M, G60 (Z180) coating designation.

## 2.6 FABRICATION

- A. Assemble truss members in design configuration indicated; use jigs or other means to ensure uniformity and accuracy of assembly, with joints closely fitted to comply with tolerances in TPI 1. Position members to produce design camber indicated.
  - 1. Fabricate wood trusses within manufacturing tolerances in TPI 1 and as follows:
    - a. Length: 1/2 inch (13 mm) up to 30 feet (9.14 m) long, thereafter 3/4 inch (19 mm).
    - b. Height: 1/4 inch (6.4 mm) up to 60 inches (1524 mm) high, thereafter 1/2 inch (13 mm).
- B. Connect truss members by metal connector plates located and securely embedded simultaneously in both sides of wood members by air or hydraulic press.

## PART 3 - EXECUTION

## 3.1 INSTALLATION

- A. Install wood trusses only after supporting construction is in place and is braced and secured.
- B. If trusses are delivered to Project site in more than one piece, assemble trusses before installing.
- C. Hoist trusses in place by lifting equipment suited to sizes and types of trusses required, exercising care not to damage truss members or joints by out-of-plane bending or other causes.
- D. Install and brace trusses according to TPI recommendations and as indicated.
- E. Anchor trusses securely at bearing points; use metal truss tie-downs or floor truss hangers as applicable. Install fasteners through each fastener hole in metal framing anchors according to manufacturer's fastening schedules and written instructions.
- F. Install and fasten permanent bracing during truss erection and before construction loads are applied. Anchor ends of permanent bracing where terminating at walls or beams.
  - 1. Install bracing to comply with Section 06 1000 "Rough Carpentry."
- G. Install wood trusses within installation tolerances in TPI 1 and as follows:
  - 1. Out-of-plumb tolerance of the lesser of  $D/50$  or 2 inches (50 mm) maximum.
  - 2. Out-of-plane tolerances or bow is limited to the lesser of  $L/200$  or 2 inches (50 mm) maximum.
  - 3. Location variances of 1/4 inch (6.4 mm) and a top-chord bearing gap of 1/2 inch (13 mm) for parallel-chord trusses are also permitted.
- H. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.
- I. Replace wood trusses that are damaged or do not comply with requirements.

END OF SECTION 06 1753

**SECTION 06 18 00  
GLUED-LAMINATED CONSTRUCTION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Glue laminated wood beams and purlins.
- B. Preservative treatment of wood.
- C. Fire retardant treatment of wood.
- D. Steel hardware and attachment brackets.

**1.02 RELATED REQUIREMENTS**

- A. Section 01 61 16 - Volatile Organic Compound (VOC) Content Restrictions.
- B. Section 09 91 13 - Exterior Painting: Field finishing.
- C. Section 09 91 23 - Interior Painting: Field finishing.
- D. Section 09 93 00 - Staining and Transparent Finishing: Field finishing.

**1.03 PRICE AND PAYMENT PROCEDURES**

- A. See Section 01 22 00 - Unit Prices, for additional unit price requirements.
- B. Glue Laminated Structural Column Members: By the unit. Includes unit member shop finished, connectors and brackets, placed and anchored.
- C. Connections: By the pound. Includes fabrication, finishing, and installation.

**1.04 REFERENCE STANDARDS**

- A. AITC 117 - Standard Specifications for Structural Glued Laminated Timber of Softwood Species 2010.
- B. AITC A190.1 - American National Standard for Wood Products - Structural Glued Laminated Timber 2007.
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- E. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- F. ASTM A563 - Standard Specification for Carbon and Alloy Steel Nuts 2015.
- G. ASTM A563M - Standard Specification for Carbon and Alloy Steel Nuts (Metric) 2007 (Reapproved 2013).
- H. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- I. ASTM D2559 - Standard Specification for Adhesives for Bonded Structural Wood Products for Use Under Exterior Exposure Conditions 2012a (Reapproved 2018).
- J. ASTM D2898 - Standard Test Methods for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing 2010 (Reapproved 2017).
- K. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.
- L. ASTM F3125/F3125M - Standard Specification for High Strength Structural Bolts and Assemblies, Steel and Alloy Steel, Heat Treated, Inch Dimensions 120 ksi and 150 ksi Minimum Tensile Strength, and Metric Dimensions 830 MPa and 1040 MPa Minimum Tensile Strength 2019, with Editorial Revision (2020).

- M. AWWA U1 - Use Category System: User Specification for Treated Wood 2018.
- N. AWS B2.1/B2.1M - Specification for Welding Procedure and Performance Qualification 2014 (Amended 2015).
- O. AWS D1.1/D1.1M - Structural Welding Code - Steel 2020.
- P. FM (AG) - FM Approval Guide current edition.
- Q. ITS (DIR) - Directory of Listed Products current edition.
- R. RIS (GR) - Standard Specifications for Grades of California Redwood Lumber 2019.
- S. SPIB (GR) - Grading Rules 2014.
- T. UL (DIR) - Online Certifications Directory Current Edition.
- U. UL (FRD) - Fire Resistance Directory Current Edition.
- V. WCLIB (GR) - Standard Grading Rules for West Coast Lumber No. 17 2018.
- W. WWPA G-5 - Western Lumber Grading Rules 2017.

#### **1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide technical data on wood preservative materials, application technique and resultant performance information.
- C. Shop Drawings: Indicate framing system, sizes and spacing of members, loads and cambers, bearing and anchor details, bridging and bracing, framed openings.
  - 1. Submit design calculations signed and sealed by design engineer.
- D. Designer's Qualification Statement.
- E. Manufacturer's Qualification Statement.
- F. Welders' Qualification Statement: Welders' certificates in accordance with AWS B2.1/B2.1M and dated no more than 12 months before start of scheduled welding work.
- G. Erector's Qualification Statement.

#### **1.06 QUALITY ASSURANCE**

- A. Designer Qualifications: Design structural members under direct supervision of a Professional Structural Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Manufacturer/Fabricator Qualifications: Company specializing in manufacture of glue laminated structural units with three years of documented experience, and certified by AITC in accordance with AITC A190.1.
- C. Erector Qualifications: Company specializing in erection of products of the type specified with 5 years documented experience, and approved by manufacturer.
- D. Welder Qualifications: Welding processes and welding operators qualified in accordance with AWS D1.1/D1.1M and no more than 12 months before start of scheduled welding work.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Protect members to AITC requirements for not wrapped.
- B. Leave individual wrapping in place until finishing occurs.
- C. Fire Retardant Treated Wood: Prevent exposure to precipitation during shipping, storage, or installation.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Glued-Laminated Structural Units:
  - 1. Sentinel Structures, Inc.
  - 2. Western Wood Structures, Inc.
  - 3. Boise Cascade Corporation.
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 GLUED-LAMINATED UNITS**

- A. Glued-Laminated Units: Fabricate in accordance with AITC 117 Architectural grade.
  - 1. Verify dimensions and site conditions prior to fabrication.
  - 2. Cut and fit members accurately to length to achieve tight joint fit.
  - 3. Fabricate member with camber built in.
  - 4. Do not splice or join members in locations other than those indicated without permission.
  - 5. Fabricate steel hardware and connections with joints neatly fitted, welded, and ground smooth.
  - 6. Welding: Perform welding in accordance with AWS D1.1/D1.1M.
  - 7. After end trimming, seal with penetrating sealer in accordance with AITC requirements.

### **2.03 MATERIALS**

- A. Lumber: Douglas-Fir, Hemlock, Larch, or Southern Pine lumber complying with RIS (GR) grading rules with 12 percent maximum moisture content before fabrication. See general notes on the structural plans for the required material properties.
- B. Steel Connections and Brackets: ASTM A36/A36M weldable quality, galvanize per ASTM A123/A123M.
- C. Anchor Bolts: ASTM F3125/F3125M, Type 1 heavy hex high strength bolts and ASTM A563 (ASTM A563M) nuts; hot-dip galvanized to meet requirements of ASTM A153/A153M, matching washers.
- D. Laminating Adhesive: Tested for wet/exterior service in accordance with ASTM D2559.
- E. Bearing Plate Anchors: Expansion shield and lag bolt type for anchorage to solid masonry or concrete.

### **2.04 FABRICATION**

- A. Fabricate glue laminated structural members in accordance with AITC Architectural grade.
- B. Welding: Perform welding in accordance with AWS D1.1/D1.1M.
- C. Verify dimensions and site conditions prior to fabrication.
- D. Cut and fit members accurately to length to achieve tight joint fit.
- E. Fabricate member with camber built in.
- F. Do not splice or join members in locations other than those indicated without permission.
- G. Fabricate steel hardware and connections with joints neatly fitted, welded, and ground smooth.
- H. After end trimming, seal with penetrating sealer in accordance with AITC requirements.
- I. Field Finishing of Members: Specified in Section 09 91 13 and 09 91 23.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that supports are ready to receive units.
- B. Verify sufficient end bearing area.

### **3.02 PREPARATION**

- A. Coordinate placement of bearing items.

### **3.03 ERECTION**

- A. Lift members using protective straps to prevent visible damage.
- B. Set structural members level and plumb, in correct positions or sloped where indicated.
- C. Provide temporary bracing and anchorage to hold members in place until permanently secured.
- D. Fit members together accurately without trimming, cutting, splicing, or other unauthorized modification.
- E. Swab and seal the interior wood surfaces of field drilled holes in members with primer.
- F. Field Finishing: Specified in Section 09 91 13 and 09 91 23.

### **3.04 TOLERANCES**

- A. Framing Members: 1/2 inch maximum from true position.

**END OF SECTION**

**SECTION 06 83 16**  
**FIBERGLASS REINFORCED PANELING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fiberglass reinforced plastic panels.
- B. Trim.

**1.02 REFERENCE STANDARDS**

- A. ASTM D5319 - Standard Specification for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels 2017.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Store panels flat, indoors, on a clean, dry surface. Remove packaging and allow panels to acclimate to room temperature for 48 hours prior to installation.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Fiberglass Reinforced Plastic Panels:
  - 1. Crane Composites, Inc: [www.cranecomposites.com/#sle](http://www.cranecomposites.com/#sle).
  - 2. Marlite, Inc: [www.marlite.com/#sle](http://www.marlite.com/#sle).
  - 3. Nudo Products, Inc: [www.nudo.com/#sle](http://www.nudo.com/#sle).

**2.02 PANEL SYSTEMS**

- A. Wall Panels:
  - 1. Panel Size: 4 by 8 feet.
  - 2. Panel Thickness: 0.09 inch.
  - 3. Surface Design: Smooth.
  - 4. Color: As selected by Architect.
  - 5. Attachment Method: Adhesive only, sealant joints, no trim.

**2.03 MATERIALS**

- A. Panels: Fiberglass reinforced plastic (FRP), complying with ASTM D5319.
  - 1. Surface Burning Characteristics: Maximum flame spread index of 25 and smoke developed index of 450; when system tested in accordance with ASTM E84.
- B. Trim: Vinyl; color coordinating with panel.
- C. Adhesive: Type recommended by panel manufacturer.
- D. Sealant: Type recommended by panel manufacturer; white.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify existing conditions and substrate flatness before starting work.
- B. Verify that substrate conditions are ready to receive the work of this section.



### **3.02 INSTALLATION - WALLS**

- A. Install panels in accordance with manufacturer's instructions.
- B. Cut and drill panels with carbide tipped saw blades, drill bits, or snips.
- C. Apply adhesive to the back side of the panel using trowel as recommended by adhesive manufacturer.
- D. Apply panels to wall with seams plumb and pattern aligned with adjoining panels.
- E. Install panels with manufacturer's recommended gap for panel field and corner joints.
- F. Place trim on panel before fastening edges, as required.
- G. Fill channels in trim with sealant before attaching to panel.
- H. Install trim with adhesive and screws or nails, as required.
- I. Seal gaps at floor, ceiling, and between panels with applicable sealant to prevent moisture intrusion.
- J. Remove excess sealant after paneling is installed and prior to curing.

**END OF SECTION**

**SECTION 07 11 13  
BITUMINOUS DAMPPROOFING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Bituminous dampproofing.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 21 00 - Thermal Insulation: Rigid insulation board used as protection board.

**1.03 REFERENCE STANDARDS**

- A. ASTM D1187/D1187M - Standard Specification for Asphalt-Base Emulsions for Use as Protective Coatings for Metal 1997 (Reapproved 2018).
- B. ASTM D1227/D1227M - Standard Specification for Emulsified Asphalt Used as a Protective Coating for Roofing 2019.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide properties of primer, bitumen, and mastics.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing the work of this section with at least three years of experience.

**PART 2 PRODUCTS**

**2.01 BITUMINOUS DAMPPROOFING**

- A. Bituminous Dampproofing: Cold-applied water-based emulsion; asphalt with mineral colloid or chemical emulsifying agent; with or without fiber reinforcement; asbestos-free; suitable for application on vertical and horizontal surfaces.
  - 1. Composition - Vertical Application: ASTM D1227/D1227M Type III or ASTM D1187/D1187M Type I.
  - 2. Composition - Horizontal and Low-Slope Application: ASTM D1227/D1227M Type II or III.
  - 3. VOC Content: Not more than permitted by local, State, and federal regulations.
  - 4. Applied Thickness: 1/16 inch, minimum, wet film.
- B. Primers, Mastics, and Related Materials: Type as recommended by dampproofing manufacturer.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify existing conditions are acceptable prior to starting this work.
- B. Verify substrate surfaces are durable, free of matter detrimental to adhesion or application of dampproofing system.
- C. Verify that items penetrating surfaces to receive dampproofing are securely installed.

**3.02 PREPARATION**

- A. Protect adjacent surfaces not designated to receive dampproofing.
- B. Clean and prepare surfaces to receive dampproofing in accordance with manufacturer's instructions.
- C. Do not apply dampproofing to surfaces unacceptable to manufacturer.
- D. Apply mastic to seal penetrations, small cracks, or minor honeycombs in substrate.

### **3.03 APPLICATION**

- A. Foundation Walls: Apply two coats of asphalt dampproofing.
- B. Perform this work in accordance with manufacturer's instructions and NRCA (WM) applicable requirements.
- C. Apply bitumen with roller.
- D. Apply from 2 inches below finish grade elevation down to top of footings.
- E. Seal items watertight with mastic, that project through dampproofing surface.

**END OF SECTION**

**SECTION 07 19 00  
WATER REPELLENTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Water repellents applied to exterior, masonry surfaces.
- B. Pressure washing.

**1.02 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, limitations, and chemical composition.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention; cautionary procedures required during application.

**1.03 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of experience

**1.04 MOCK-UP**

- A. Prepare representative surface 36 by 36 inches in size using specified materials and preparation and application methods on surfaces identical to those to be coated; approved mock-up constitutes standard for workmanship.
- B. For proposed substitutions, prepare side-by-side mock-ups of specified and substitute products.
- C. Mock-up may remain as part of the Work.

**1.05 FIELD CONDITIONS**

- A. Protect liquid materials from freezing.
- B. Do not apply water repellent when ambient temperature is lower than 50 degrees F or higher than 100 degrees F.

**1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty for performance.
  - 1. Include coverage for degradation of waterproofing ability and reduction in graffiti resistance on designated substrate.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Silane, Siloxane, Silane-Siloxane Blend, and Siliconate Water Repellents:
  - 1. Evonik Corporation: [www.evonik.com/#sle](http://www.evonik.com/#sle).
  - 2. PROSOCO, Inc: [www.prosoco.com/#sle](http://www.prosoco.com/#sle).
  - 3. Sherwin-Williams Company: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 MATERIALS**

- A. Water Repellent: Non-glossy, colorless, penetrating, water-vapor-permeable, non-yellowing sealer, that dries invisibly leaving appearance of substrate unchanged.
  - 1. Applications: Vertical surfaces and non-traffic horizontal surfaces.
  - 2. Number of Coats: Two.
  - 3. Maintains dry appearance when wetted.

4. Silane, siloxane, silane-siloxane blend, or siliconate that reacts chemically with concrete and masonry.
  - a. Manufacturers:
    - 1) PROSOCO, Inc; Consolideck SL100 Water Repellent, with VOC of 400 g/L or less: [www.prosoco.com/#sle](http://www.prosoco.com/#sle).
    - 2) Sherwin-Williams Company; Loxon 40 percent Low VOC Silane Water Repellant, with VOC of 343 g/L or less: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
    - 3) Substitutions: See Section 01 60 00 - Product Requirements.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify joint sealants are installed and cured.
- C. Verify surfaces to be coated are dry, clean, and free of efflorescence, oil, or other matter detrimental to application of water repellent.

### **3.02 PREPARATION**

- A. Protection of Adjacent Work:
  1. Protect adjacent landscaping, property, and vehicles from drips and overspray.
  2. Protect adjacent surfaces not intended to receive water repellent.
- B. Prepare surfaces to be coated as recommended by water repellent manufacturer for best results.
- C. Pressure wash surfaces to be coated.
- D. Allow surfaces to dry completely to degree recommended by water repellent manufacturer before starting coating work.

### **3.03 APPLICATION**

- A. Apply water repellent in accordance with manufacturer's instructions, using procedures and application methods recommended as producing the best results.
- B. Apply two coats, minimum.
- C. Remove water repellent from unintended surfaces immediately by a method instructed by water repellent manufacturer.

**END OF SECTION**

**SECTION 07 21 00  
THERMAL INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Board insulation at cavity wall construction, perimeter foundation wall, and exterior wall behind fiber cement siding wall finish.
- B. Batt insulation in floor construction over crawlspace.

**1.02 REFERENCE STANDARDS**

- A. ASTM C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation 2019.
- B. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.
- D. ASTM E136 - Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750°C 2019a.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on product characteristics, performance criteria, and product limitations.

**PART 2 PRODUCTS**

**2.01 APPLICATIONS**

- A. Insulation at Perimeter of Foundation: Extruded polystyrene (XPS) board.
- B. Insulation Inside Masonry Cavity Walls: Extruded polystyrene (XPS) board.
- C. Insulation Over Wood Stud Framed Walls, Continuous: Extruded polystyrene (XPS) board.
- D. Insulation in Wood Framed Floors: Batt insulation with no vapor retarder.

**2.02 FOAM BOARD INSULATION MATERIALS**

- A. Extruded Polystyrene (XPS) Board Insulation: Complies with ASTM C578 with either natural skin or cut cell surfaces.
  - 1. Type and Compressive Resistance: Type IV, 25 psi (173 kPa), minimum.
  - 2. Flame Spread Index (FSI): Class A - 0 to 25, when tested in accordance with ASTM E84.
  - 3. Smoke Developed Index (SDI): 450 or less, when tested in accordance with ASTM E84.
  - 4. Type and Thermal Resistance, R-value: Type IV, 5.0 (0.88) per 1 inch thickness at 75 degrees F mean temperature.
  - 5. Type and Water Absorption: Type IV, 0.3 percent by volume, maximum, by total immersion.
  - 6. Products:
    - a. DuPont de Nemours, Inc; Styrofoam Brand Square Edge: [building.dupont.com/#sle](http://building.dupont.com/#sle).
    - b. Owens Corning Corporation; FOAMULAR Extruded Polystyrene (XPS) Insulation: [www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.

**2.03 BATT INSULATION MATERIALS**

- A. Where batt insulation is indicated, either glass fiber or mineral fiber batt insulation may be used, at Contractor's option.
- B. Glass Fiber Batt Insulation: Flexible preformed batt or blanket, complying with ASTM C665; friction fit.

1. Combustibility: Non-combustible, when tested in accordance with ASTM E136.
  2. Formaldehyde Content: Zero.
  3. Facing: Unfaced.
  4. Products:
    - a. CertainTeed Corporation: [www.certainteed.com/#sle](http://www.certainteed.com/#sle).
    - b. Johns Manville: [www.jm.com/#sle](http://www.jm.com/#sle).
    - c. Owens Corning Corporation: [www.ocbuildingspec.com/#sle](http://www.ocbuildingspec.com/#sle).
    - d. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Mineral Fiber Batt Insulation: Flexible or semi-rigid preformed batt or blanket, complying with ASTM C665; friction fit; unfaced flame spread index of 0 (zero) when tested in accordance with ASTM E84.
1. Flame Spread Index: 25 or less, when tested in accordance with ASTM E84.
  2. Smoke Developed Index: 0 (zero), when tested in accordance with ASTM E84.
  3. Products:
    - a. Johns Manville; MinWool Sound Attenuation Fire Batts: [www.jm.com/#sle](http://www.jm.com/#sle).
    - b. Knauf Insulation; EcoBatt Insulation: [www.knaufinsulation.com/#sle](http://www.knaufinsulation.com/#sle).
    - c. Thermafiber, Inc; SAFB: [www.thermafiber.com/#sle](http://www.thermafiber.com/#sle).

## **2.04 ACCESSORIES**

- A. Insulation Fasteners (Floor): Lengths of unfinished, 13 gauge, 0.072 inch high carbon spring steel with chisel or mitered tips, held in place by tension, length to suit insulation thickness and substrate, capable of securely supporting insulation in place.
- B. Adhesive (Walls): Type recommended by insulation manufacturer for application.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate, adjacent materials, and insulation materials are dry and that substrates are ready to receive insulation.
- B. Verify substrate surfaces are flat, free of honeycomb, fins, irregularities, or materials or substances that may impede adhesive bond.

### **3.02 BOARD INSTALLATION AT FOUNDATION PERIMETER**

- A. Apply adhesive to back of boards:
  1. Three continuous beads per board length.
- B. Install boards horizontally on foundation perimeter.
  1. Place boards to maximize adhesive contact.
  2. Butt edges and ends tightly to adjacent boards and to protrusions.
- C. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

### **3.03 BOARD INSTALLATION AT EXTERIOR WALLS**

- A. Apply adhesive to back of boards:
  1. Three continuous beads per board length.
- B. Install boards horizontally on walls in running bond pattern.
- C. Extend boards over expansion joints, unbonded to wall on one side of joint.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

### **3.04 BOARD INSTALLATION AT CAVITY WALLS**

- A. Apply adhesive to back of boards:
  1. Three continuous beads per board length.
- B. Install boards to fit snugly between wall ties.
- C. Install boards horizontally on walls.

1. Install in running bond pattern.
  2. Butt edges and ends tightly to adjacent boards and protrusions.
- D. Cut and fit insulation tightly to protrusions or interruptions to the insulation plane.

### **3.05 BATT INSTALLATION**

- A. Install insulation in accordance with manufacturer's instructions.
- B. Install in raised floor spaces without gaps or voids. Do not compress insulation.
- C. Trim insulation neatly to fit spaces. Insulate miscellaneous gaps and voids.
- D. Fit insulation tightly in cavities and tightly to exterior side of mechanical and electrical services within the plane of the insulation.

**END OF SECTION**



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**SECTION 07 21 19  
FOAMED-IN-PLACE INSULATION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Foamed-in-place insulation.
  - 1. In exterior framed walls.
  - 2. In exterior wall crevices.
- B. Protective intumescent coating.

**1.02 REFERENCE STANDARDS**

- A. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2017.
- B. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics 2019.
- C. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.
- D. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.
- E. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials 2013.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide product description, insulation properties, and preparation requirements.
- C. Manufacturer's Installation Instructions: Indicate special procedures, and perimeter conditions requiring special attention.
- D. Installer Qualification: Submit documentation of current contractor accreditation and current installer certification. Keep copies of all contractor accreditation and installer certification on site during and after installation. Present on-site documentation upon request.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified, with minimum three years experience, and approved by manufacturer.

**1.05 FIELD CONDITIONS**

- A. Do not apply foam when temperature is below that specified by the manufacturer for ambient air and substrate.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Foamed-In-Place Insulation: Medium-density, rigid or semi-rigid, open or closed cell polyurethane foam; foamed on-site, using blowing agent of water or non-ozone-depleting gas.
  - 1. Thermal Resistance: R-value of 5.0, minimum, per 1 inch thickness at 75 degrees F mean temperature when tested in accordance with ASTM C518.
  - 2. Water Vapor Permeance: Vapor retarder; 2 perms, maximum, when tested at intended thickness in accordance with ASTM E96/E96M, desiccant method.
  - 3. Water Absorption: Less than 2 percent by volume, maximum, when tested in accordance with ASTM D2842.
  - 4. Air Permeance: 0.04 cfm per square foot, maximum, when tested at intended thickness in accordance with ASTM E2178 at 1.57 psf.
  - 5. Closed Cell Content: At least 90 percent.

6. Surface Burning Characteristics: Flame spread/Smoke developed index of 25/450, maximum, when tested in accordance with ASTM E84.
7. Acceptable Manufacturers:
  - a. BASF Corporation; WALLTITE US: [www.spf.basf.com/#sle](http://www.spf.basf.com/#sle).
  - b. Carlisle Spray Foam Insulation; SealTite Pro One Zero: [www.carlisesfi.com/#sle](http://www.carlisesfi.com/#sle).
  - c. Johns Manville; JM Corbond III Closed Cell Spray Polyurethane Foam: [www.jm.com/#sle](http://www.jm.com/#sle).
8. Substitutions: See Section 01 60 00 - Product Requirements.

## **2.02 ACCESSORIES**

- A. Primer: As required by insulation manufacturer.
- B. Protective Coating: Intumescent coating of type recommended by insulation manufacturer and as required to comply with applicable codes.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify work within construction spaces or crevices is complete prior to insulation application.
- B. Verify that surfaces are clean, dry, and free of matter that may inhibit insulation or overcoat adhesion.

### **3.02 PREPARATION**

- A. Mask and protect adjacent surfaces from over spray or dusting.
- B. Apply primer in accordance with manufacturer's instructions.

### **3.03 APPLICATION**

- A. Apply insulation in accordance with manufacturer's instructions.
- B. Apply overcoat monolithically, without voids to fully cover foam insulation, to achieve fire rating required.
- C. Patch damaged areas.
- D. Where applied to voids and gaps assure space for expansion to avoid pressure on adjacent materials that may bind operable parts.
- E. Trim excess away for applied trim or remove as required for continuous sealant bead.

### **3.04 FIELD QUALITY CONTROL**

- A. Field inspections and tests will be performed by an independent testing agency under provisions of Section 01 40 00 - Quality Requirements.
- B. Inspection will include verification of insulation and overcoat thickness and density.

**END OF SECTION**

**SECTION 07 25 00  
WEATHER BARRIERS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Vapor Retarders: Materials to make crawlspace ground surface water vapor resistant.
- B. Air Barriers: Materials that form a system to stop passage of air through exterior walls, joints between exterior walls and roof, joints around frames of openings in exterior walls, and joints between floor framing and foundations.

**1.02 DEFINITIONS**

- A. Weather Barrier: Assemblies that form either water-resistive barriers, air barriers, or vapor retarders.
- B. Air Barrier: Air tight barrier made of material that is relatively air impermeable but water vapor permeable, both to the degree specified, with sealed seams and with sealed joints to adjacent surfaces. Note: For the purposes of this specification, vapor impermeable air barriers are classified as vapor retarders.
- C. Vapor Retarder: Air tight barrier made of material that is relatively water vapor impermeable, to the degree specified, with sealed seams and with sealed joints to adjacent surfaces.
  - 1. Water Vapor Permeance: For purposes of conversion,  $57.2 \text{ ng}/(\text{Pa s sq m}) = 1 \text{ perm}$ .

**1.03 REFERENCE STANDARDS**

- A. AATCC Test Method 127 - Water Resistance: Hydrostatic Pressure Test 2018.
- B. ASTM D1970/D1970M - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection 2020.
- C. ASTM D4397 - Standard Specification for Polyethylene Sheeting for Construction, Industrial, and Agricultural Applications 2016.
- D. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.
- E. ASTM E96/E96M - Standard Test Methods for Water Vapor Transmission of Materials 2016.
- F. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials 2013.
- G. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components 2019.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on material characteristics.
- C. Manufacturer's Installation Instructions: Indicate preparation.

**1.05 MOCK-UP**

- A. Install air barrier materials in mock-up specified in Section 04 20 01.

**PART 2 PRODUCTS**

**2.01 WEATHER BARRIER ASSEMBLIES**

- A. Air Barrier:
  - 1. On outside surface of sheathing of framed exterior walls use air barrier sheet, mechanically fastened type.

**2.02 AIR BARRIER MATERIALS (WATER VAPOR PERMEABLE AND WATER-RESISTIVE)**

- A. Air Barrier Sheet, Mechanically Fastened:
  - 1. Air Permeance: 0.004 cfm/sq ft, maximum, when tested in accordance with ASTM E2178.

2. Water Vapor Permeance: 5 perms, minimum, when tested in accordance with ASTM E96/E96M Procedure A (Desiccant Method) at 73.4 degrees F.
3. Water Penetration Resistance: Withstand a water head of 21 inches, minimum, for minimum of 5 hours, when tested in accordance with AATCC Test Method 127.
4. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 180 days of weather exposure.
5. Surface Burning Characteristics: Flame spread index of 25 or less, and smoke developed index of 50 or less, when tested in accordance with ASTM E84.
6. Complies with NFPA 285 wall assembly requirements.
7. Seam and Perimeter Tape: Polyethylene self adhering type, 2 inches wide, compatible with sheet material; unless otherwise specified.
8. Manufacturers:
  - a. DuPont de Nemours, Inc; Tyvek CommercialWrap D with FlexWrap NF and Tyvek Tape: [building.dupont.com/#sle](http://building.dupont.com/#sle).
  - b. Fortifiber Building Systems Group; WeatherSmart Commercial: [www.fortifiber.com/#sle](http://www.fortifiber.com/#sle).
  - c. Kingspan Insulation LLC; GreenGuard MAX Building Wrap: [www.trustgreenguard.com/#sle](http://www.trustgreenguard.com/#sle).
  - d. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.03 VAPOR RETARDER MATERIALS (AIR BARRIER AND WATER-RESISTIVE)**

- A. Vapor Retarder Sheet: ASTM D4397 polyethylene film reinforced with glass fiber square mesh, clear.
  1. Thickness: 10 mil, 0.010 inch.
  2. Water Vapor Permeance: As required by referenced standard for thickness specified.
  3. Seam and Perimeter Tape: Polyethylene self adhering type, 2 inches wide, compatible with sheet material.

### **2.04 ACCESSORIES**

- A. Sealants, Tapes, and Accessories for Sealing Air Barrier and Sealing Air Barrier to Adjacent Substrates: As specified or as recommended by weather barrier manufacturer.
- B. Flexible Flashing: Self-adhesive sheet flashing complying with ASTM D1970/D1970M, except slip resistance requirement is waived if not installed on a roof.
- C. Sill Plate Sealer: Closed-cell foam tape with rubberized adhesive membrane; bridges gap between foundation structure and sill plate or skirt board.
  1. Width: 5-1/2 inches.
  2. Ultraviolet (UV) and Weathering Resistance: Approved in writing by manufacturer for up to 30 days of weather exposure.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that surfaces and conditions are ready to accept the work of this section.

### **3.02 PREPARATION**

- A. Remove projections, protruding fasteners, and loose or foreign matter that might interfere with proper installation.

### **3.03 INSTALLATION**

- A. Install materials in accordance with manufacturer's instructions.
- B. Air Barriers: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.
- C. Vapor Retarders: Install continuous air tight barrier over surfaces indicated, with sealed seams and with sealed joints to adjacent surfaces.

- D. Mechanically Fastened Sheets - On Exterior:
1. Install sheets shingle-fashion to shed water, with seams generally horizontal.
  2. Overlap seams as recommended by manufacturer but at least 6 inches.
  3. Overlap at outside and inside corners as recommended by manufacturer but at least 12 inches.
  4. For applications specified to be air tight, seal seams, laps, penetrations, tears, and cuts with self-adhesive tape; use only large-headed, gasketed fasteners recommended by the manufacturer.
  5. Install air barrier underneath the jamb flashings.
  6. Install head flashings under air barrier.
  7. At openings to be filled with frames having nailing flanges, wrap excess sheet into opening; at head, seal sheet over flange and flashing.
- E. Openings and Penetrations in Exterior Weather Barriers:
1. Install flashing over sills, covering entire sill frame member, extending at least 5 inches onto weather barrier and at least 6 inches up jambs; mechanically fasten stretched edges.
  2. At openings to be filled with frames having nailing flanges, seal head and jamb flanges using a continuous bead of sealant compressed by flange and cover flanges with sealing tape at least 4 inches wide; do not seal sill flange.
  3. At openings to be filled with non-flanged frames, seal weather barrier to each side of opening framing, using flashing at least 9 inches wide, covering entire depth of framing.
  4. At head of openings, install flashing under weather barrier extending at least 2 inches beyond face of jambs; seal weather barrier to flashing.
  5. At interior face of openings, seal gap between window/door frame and rough framing, using joint sealant over backer rod.
  6. Service and Other Penetrations: Form flashing around penetrating item and seal to weather barrier surface.

**END OF SECTION**

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**SECTION 07 42 13.23**  
**METAL COMPOSITE MATERIAL WALL PANELS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Exterior cladding consisting of formed metal composite material (MCM) sheet, secondary supports, and anchors to structure, attached to solid backup.
- B. Matching flashing and trim.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 62 00 - Sheet Metal Flashing and Trim: Metal flashing components integrated with this wall system.

**1.03 REFERENCE STANDARDS**

- A. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- C. ASTM A153/A153M - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware 2016a.
- D. ASTM A276/A276M - Standard Specification for Stainless Steel Bars and Shapes 2017.
- E. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip 2020a.
- F. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- G. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- H. ASTM A792/A792M - Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process 2010 (Reapproved 2015).
- I. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- J. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- K. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2020.
- L. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2013.
- M. ASTM D1781 - Standard Test Method for Climbing Drum Peel for Adhesives 1998 (Reapproved 2012).
- N. ASTM D1929 - Standard Test Method for Determining Ignition Temperature of Plastics 2020.
- O. ASTM D4145 - Standard Test Method for Coating Flexibility of Prepainted Sheet 2010 (Reapproved 2018).
- P. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Meeting: Convene one week before starting work of this section to verify project requirements, coordinate with installers of other work, establish condition and completeness of building substrate, and review manufacturers' installation instructions and warranty requirements.
  - 1. Require attendance by the installer and relevant sub-contractors.



2. Include MCM sheet manufacturer's representative and wall system manufacturer's representative to review storage and handling procedures.
3. Review in detail truck transportation, parking, vertical transportation, schedule, personnel, installation of adjacent materials and substrate.
4. Review procedures for protection of work and other construction.

#### **1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data - MCM Sheets: Manufacturer's data sheets on each product to be used, including thickness, physical characteristics, and finish, and:
  1. Finish manufacturer's data sheet showing physical and performance characteristics.
  2. Storage and handling requirements and recommendations.
  3. Fabrication instructions and recommendations.
  4. Specimen warranty for finish, as specified herein.
- C. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
  1. Physical characteristics of components shown on shop drawings.
  2. Storage and handling requirements and recommendations.
  3. Installation instructions and recommendations.
  4. Specimen warranty for wall system, as specified herein.
- D. Shop Drawings: Show layout and elevations, dimensions and thickness of panels, connections, details and location of joints, sealants and gaskets, method of anchorage, support clips, number of anchors, supports, reinforcement, trim, flashings, and accessories.
  1. Indicate panel numbering system.
  2. Differentiate between shop and field fabrication.
  3. Indicate substrates and adjacent work with which the wall system must be coordinated.
  4. Include large-scale details of anchorages and connecting elements.
  5. Include large-scale details or schematic, exploded or isometric diagrams to fully explain flashing at a scale of not less than 1-1/2 inches per 12 inches.
- E. Selection Samples: For each finish product specified, submit at least two sample color chips representing manufacturer's standard range of available colors and patterns.
  1. Sealant Color: Color to match wall panels.
- F. Installer's Qualification Statement.
- G. Maintenance Data: Care of finishes and warranty requirements.
- H. Executed Warranty: Submit warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

#### **1.06 QUALITY ASSURANCE**

- A. Field Measurements: Verify actual dimensions by field measurement before fabrication; show recorded measurements on shop drawings.
- B. Manufacturer Qualifications: Company specializing in manufacturing wall panel systems specified in this section.
  1. With not less than three years of experience.
  2. Approved by MCM sheet manufacturer.
- C. Installer Qualifications: Company specializing in performing work of the type specified in this section.
  1. With minimum three years of experience.
  2. Approved by wall panel system manufacturer.

## 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products in manufacturer's original, unopened, undamaged containers with identification labels intact.
  - 1. Protect finishes by applying heavy-duty removable plastic film during production.
  - 2. Package for protection against transportation damage.
  - 3. Provide markings to identify components consistently with drawings.
  - 4. Exercise care in unloading, storing, and installing panels to prevent bending, warping, twisting, and surface damage.
- B. Store products protected from exposure to harmful weather conditions and at temperature conditions recommended by manufacturer.
  - 1. Store in well-ventilated space out of direct sunlight.
  - 2. Protect from moisture and condensation with tarpaulins or other suitable weathertight covering installed to provide ventilation.
  - 3. Store at a slope to ensure positive drainage of accumulated water.
  - 4. Do not store in enclosed space where ambient temperature can exceed 120 degrees F.
  - 5. Avoid contact with other materials that might cause staining, denting, or other surface damage.

## 1.08 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Correct defective work within a twenty year period after Date of Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.
- C. Correct defective work within a five year period after Date of Substantial Completion for delamination of panels.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Metal Composite Material (MCM) Sheet Manufacturers:
  - 1. ATAS International, Inc; SterraCore: [www.atas.com/#sle](http://www.atas.com/#sle).
  - 2. Citadel Architectural Products, Inc; Envelope 2000: [www.citadelap.com/#sle](http://www.citadelap.com/#sle).
  - 3. Laminators, Inc; Omega Lite Panels: [www.laminatorsinc.com](http://www.laminatorsinc.com).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 WALL PANEL SYSTEM

- A. Wall Panel System: Metal panels, fasteners, and anchors designed to be supported by framing or other substrate provided by others; provide installed panel system capable of maintaining specified performance without defects, damage, or failure.
  - 1. Provide panel jointing and weatherseal using open joints.
  - 2. Anchor panels to supporting framing without exposed fasteners.

### 2.03 PERFORMANCE REQUIREMENTS

- A. Thermal Movement: Provide for free and noiseless vertical and horizontal thermal movement due to expansion and contraction under material temperature range of minus 20 degrees F to 180 degrees F without buckling, opening of joints, undue stress on fasteners, or other detrimental effects; allow for ambient temperature at time of fabrication, assembly, and erection procedures.

### 2.04 PANELS

- A. Panels: 1 inch deep pans formed of metal composite material sheet by routing back edges of sheet, removing corners, and folding edges.
  - 1. Reinforce corners with riveted aluminum angles.
  - 2. Provide concealed attachment to supporting structure by adhering attachment members to back of panel; attachment members may also function as stiffeners.

3. Maintain maximum panel bow of 0.8 percent of panel dimension in width and length; provide stiffeners of sufficient size and strength to maintain panel flatness without showing local stresses or read-through on panel face.
4. Secure members to back face of panels using structural silicone sealant approved by MCM sheet manufacturer.
5. Fabricate panels under controlled shop conditions.
6. Where final dimensions cannot be established by field measurement before commencement of manufacturing, make allowance for field adjustments without requiring field fabrication of panels.
7. Fabricate as indicated on drawings and as recommended by MCM sheet manufacturer.
  - a. Make panel lines, breaks, curves, and angles sharp and true.
  - b. Keep plane surfaces free from warp or buckle.
  - c. Keep panel surfaces free of scratches or marks caused during fabrication.
8. Provide joint details providing a watertight and structurally sound wall panel system that allows no uncontrolled water penetration on inside face of panel system.
9. For "dry" jointing, secure extrusions to returned pan edges with stainless steel rivets; provide means of concealed drainage with baffles and weeps for water that might accumulate in members of system.

## 2.05 MATERIALS

- A. Metal Composite Material (MCM) Sheet: Two sheets of aluminum sandwiching a core of extruded thermoplastic material; no foamed insulation material content.
  1. Overall Sheet Thickness: 0.197 inch, minimum.
  2. Bond and Peel Strength: No adhesive failure of the bond between the core and the skin nor cohesive failure of the core itself below 22.4 inch-pound/inch with no degradation in bond performance, when tested in accordance with ASTM D1781, simulating resistance to panel delamination, after 8 hours of submersion in boiling water and after 21 days of immersion in water at 70 degrees F.
  3. Surface Burning Characteristics: Flame spread index of 25, maximum; smoke developed index of 450, maximum; when tested in accordance with ASTM E84.
  4. Flammability: Self-ignition temperature of 650 degrees F or greater when tested in accordance with ASTM D1929.
- B. Metal Framing Members: Include sub-girts, zee-clips, base and sill angles and channels, hat-shaped and rigid channels, and furring channels required for complete installation.
  1. Provide material strength, dimensions, configuration as required to meet the applied loads applied and in compliance with applicable building code.
  2. Sheet Steel Components: ASTM A653/A653M galvanized to G90/Z275 or zinc-iron alloy-coated to A60/ZF180; or ASTM A792/A792M aluminum-zinc coated to AZ60/AZM180.
  3. Stainless Steel Sheet Components: ASTM A480/A480M.
  4. Aluminum Components: ASTM B209 (ASTM B209M); or ASTM B221 (ASTM B221M).

## 2.06 FINISHES

- A. Factory Finish: Two coat fluoropolymer resin coating, approved by coating manufacturer for length of warranty specified for project, and applied by coil manufacturing facility that specializes in coil applied finishes.
  1. Coating Flexibility: Pass ASTM D4145 minimum 1T Bend at time of manufacturing.
  2. Long-Term Performance: Not less than that specified under WARRANTY in PART 1.
- B. Fluoropolymer Coil Coating System: Polyvinylidene fluoride (PVDF) multi-coat superior performing organic coatings system complying with AAMA 2605, including at least 70 percent PVDF resin, with at least 80 percent of coil coated aluminum surfaces having minimum total dry film thickness (DFT) of 0.9 mils, 0.0009 inch; color and gloss as selected by Architect from manufacturer's standard line.
- C. Color/Texture: As selected by Architect from manufacturer's standard range.

## 2.07 ACCESSORIES

- A. Flashing: Sheet aluminum; 0.040 inch thick, minimum; finish and color to match MCM sheet; see Section 07 62 00 for additional requirements.
- B. Anchors, Clips, and Accessories: Use one of the following:
  - 1. Stainless steel complying with ASTM A276/A276M, ASTM A480/A480M, or ASTM A666.
  - 2. Steel complying with ASTM A36/A36M and hot-dipped galvanized to ASTM A153/A153M.
  - 3. Steel complying with ASTM A36/A36M and hot-dipped galvanized to ASTM A123/A123M Coating Grade 10.
- C. Fasteners:
  - 1. Screws: Self-drilling or self-tapping Type 410 stainless steel or zinc-alloy steel hex washer head, with EPDM or PVC washer under heads of fasteners bearing on weather side of metal wall panels.
  - 2. Bolts: Stainless steel.
  - 3. Fasteners for Flashing and Trim: Blind fasteners of high-strength aluminum or stainless steel.
- D. Provide panel system manufacturer's and installer's standard corrosion resistant accessories, including fasteners, clips, anchorage devices, and attachments.
- E. Panel insert strips:
  - 1. Location: all joints, used to conceal the fastening clips.
  - 2. Material: match panels.
  - 3. Color: match panels.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Examine dimensions, tolerances, and interfaces with other work.
- B. Examine substrate on-site to determine that conditions are acceptable for product installation in accordance with manufacturer's written instructions.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.
- D. Notify Architect in writing of conditions detrimental to proper and timely completion of work, and do not proceed with erection until unsatisfactory conditions have been corrected.

### 3.02 PREPARATION

- A. Protect adjacent work areas and finish surfaces from damage during installation.

### 3.03 INSTALLATION

- A. Do not install products that are defective, including warped, bowed, dented, and broken members, and members with damaged finishes.
- B. Comply with instructions and recommendations of MCM sheet manufacturer and wall system manufacturer, as well as with approved shop drawings.
- C. Install wall system securely allowing for necessary thermal and structural movement; comply with wall system manufacturer's instructions for installation of concealed fasteners.
- D. Do not handle or tool products during erection in manner that damages finish, decreases strength, or results in visual imperfection or failure in performance. Return component parts that require alteration to shop for refabrication, if possible, or for replacement with new parts.
- E. Do not form panels in field unless required by wall system manufacturer and approved by the Architect; comply with MCM sheet manufacturer's instructions and recommendations for field forming.
- F. Separate dissimilar metals; use gasket fasteners, isolation shims, or isolation tape where needed to eliminate possibility of electrolytic action between metals.

- G. Install flashings as indicated on shop drawings. At flashing butt joints, provide a lap strap under flashing and seal lapped surfaces with a full bed of non-hardening sealant.
- H. Install square, plumb, straight, and true, accurately fitted, with tight joints and intersections maintaining the following installation tolerances:
  - 1. Variation From Plane or Location: 1/2 inch in 30 feet of length and up to 3/4 inch in 300 feet, maximum.
  - 2. Deviation of Vertical Member From True Line: 0.1 inch in 25 feet run, maximum.
  - 3. Deviation of Horizontal Member From True Line: 0.1 inch in 25 feet run, maximum.
  - 4. Offset From True Alignment Between Two Adjacent Members Abutting End To End, In Line: 0.03 inch, maximum.
- I. Replace damaged products.

### **3.04 CLEANING**

- A. Ensure weep holes and drainage channels are unobstructed and free of dirt and sealants.
- B. Remove protective film after installation of joint sealers, after cleaning of adjacent materials, and immediately prior to completion of work.
- C. Remove temporary coverings and protection of adjacent work areas.
- D. Clean installed products in accordance with manufacturer's instructions.

### **3.05 PROTECTION**

- A. Protect installed panel system from damage until Date of Substantial Completion.

**END OF SECTION**

**SECTION 07 42 13  
METAL WALL PANELS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Manufactured metal panels for soffit panels, subgirt framing assembly, and dumpster enclosure gates, and privacy fence, with related flashings and accessory components.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 25 00 - Weather Barriers: Weather barrier under wall panels.

**1.03 REFERENCE STANDARDS**

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data - Wall System: Manufacturer's data sheets on each product to be used, including:
  - 1. Physical characteristics of components shown on shop drawings.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation instructions and recommendations.
- C. Shop Drawings: Indicate dimensions, layout, joints, construction details, support clips, and methods of anchorage.
- D. Samples: Submit two samples of wall panel and soffit panel, 12 inches by 12 inches in size illustrating finish color, sheen, and texture.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.
- B. Installer Qualifications: Company specializing in installing products of the type specified in this section with minimum three years of experience.

**1.06 MOCK-UP**

- A. Construct mock-up, 6 feet long by 2 feet wide; include panel and soffit system, glazing, attachments to building frame, associated vapor retarder and air seal materials, weep drainage system, sealants and seals, related insulation in mock-up.
- B. Locate where directed by Architect.
- C. Mock-up may remain as part of the Work.

**1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Protect panels from accelerated weathering by removing or venting sheet plastic shipping wrap.
- B. Store prefinished material off the ground and protected from weather; prevent twisting, bending, or abrasion; provide ventilation; slope metal sheets to ensure proper drainage.
- C. Prevent contact with materials that may cause discoloration or staining of products.

**1.08 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion for degradation of panel finish, including color fading caused by exposure to weather.
- C. Correct defective work within a five year period after Date of Substantial Completion, including defects in water tightness and integrity of seals for metal wall panels.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Metal Wall Panels - Concealed Fasteners:
  - 1. ATAS International, Inc; Opaline OPF: [www.atas.com/#sle](http://www.atas.com/#sle).
  - 2. Berridge Manufacturing Company; FW-12 Panel: [www.berridge.com/#sle](http://www.berridge.com/#sle).
  - 3. Drexel Metals Inc; FW1 Flush Profile: [www.drexmet.com/#sle](http://www.drexmet.com/#sle).
  - 4. Fabral; Select Series 12: [www.fabral.com/#sle](http://www.fabral.com/#sle).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Metal Soffit Panels:
  - 1. ATAS International, Inc; DWF: [www.atas.com/#sle](http://www.atas.com/#sle).
  - 2. Berridge Manufacturing Company; FW-12 Panel: [www.berridge.com/#sle](http://www.berridge.com/#sle).
  - 3. Fabral; Decor-Flush: [www.fabral.com/#sle](http://www.fabral.com/#sle).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 MANUFACTURED METAL PANELS**

- A. Wall Panel System: Factory fabricated prefinished metal panel system, site assembled.
  - 1. Provide exterior wall panels, soffit panels, and subgirt framing assembly.
  - 2. Design and size components to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of wall.
  - 3. Design Pressure: In accordance with applicable codes.
  - 4. Maximum Allowable Deflection of Panel:  $L/180$  for length(L) of span.
  - 5. Movement: Accommodate movement within system without damage to components or deterioration of seals, movement between system and perimeter components when subject to seasonal temperature cycling; dynamic loading and release of loads; and deflection of structural support framing.
  - 6. Drainage: Provide positive drainage to exterior for moisture entering or condensation occurring within panel system.
  - 7. Fabrication: Formed true to shape, accurate in size, square, and free from distortion or defects; pieces of longest practical lengths.
  - 8. Corners: Factory-fabricated in one continuous piece with minimum 2 inch returns.
  - 9. Provide continuity of air barrier and vapor retarder seal at building enclosure elements in accordance with materials specified in Section 07 25 00.
- B. Exterior Wall Panels (for use at dumpster enclosure gates and privacy fence):
  - 1. Profile: Vertical; style as indicated.
  - 2. Side Seams: interlocking, with concealed fasteners.
  - 3. Material: Precoated steel sheet, 22 gauge, 0.0299 inch minimum thickness.
  - 4. Panel Width: 12 inches.
  - 5. Color: As selected by Architect from manufacturer's standard line.
- C. Soffit Panels:
  - 1. Profile: Style as indicated, with venting not provided.
  - 2. Material: Precoated steel sheet, 22 gauge, 0.0299 inch minimum thickness.
  - 3. Color: As selected by Architect from manufacturer's standard line.
- D. Subgirt Framing Assembly:
  - 1. 16 gauge, 0.0598 inch thick formed non-precoated steel sheet.
  - 2. Profile as indicated; to attach panel system to building.
- E. Internal and External Corners: Same material, thickness, and finish as exterior sheets; profile to suit system; shop cut and factory mitered to required angles.
- F. Expansion Joints: Same material, thickness and finish as exterior sheets; 22 gauge, [ ] inch thick; manufacturer's standard brake formed type, of profile to suit system.
- G. Trim: Same material, thickness and finish as exterior sheets; brake formed to required profiles.

H. Anchors: Galvanized steel.

## **2.03 MATERIALS**

A. Precoated Steel Sheet: Hot-dipped galvanized steel sheet, ASTM A653/A653M, Structural Steel (SS) or Forming Steel (FS), with G90/Z275 coating; continuous coil-coated on exposed surfaces with specified finish coating and on panel back with specified panel back coating.

## **2.04 FINISHES**

A. Exposed Surface Finish: Panel manufacturer's standard polyvinylidene fluoride (PVDF) coating, top coat over polyester primer.

B. Panel Backside Finish: Panel manufacturer's standard polyester wash coat.

## **2.05 ACCESSORIES**

A. Cladding Support Clips: Thermally-broken, galvanized steel clips for support of cladding z-girts, angles, channels and other framing.

1. Galvanized Steel Sheet: ASTM A653/A653M, with G90/Z275 galvanized coating.

B. Gaskets: Manufacturer's standard type suitable for use with system, permanently resilient; ultraviolet and ozone resistant.

C. Concealed Sealants: Non-curing butyl sealant or tape sealant.

D. Exposed Sealant: Elastomeric; silicone, polyurethane, or silyl-terminated polyether/polyurethane.

E. Fasteners: Manufacturer's standard type to suit application; with soft neoprene washers, steel, hot dip galvanized.

F. Field Touch-up Paint: As recommended by panel manufacturer.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

A. Verify that building framing members are ready to receive panels.

B. Verify that weather barrier has been installed over substrate completely and correctly.

### **3.02 PREPARATION**

A. Install subgirts perpendicular to panel length, securely fastened to substrates and shimmed and leveled to uniform plane. Space at 24 inches on center, maximum.

### **3.03 INSTALLATION**

A. Install panels on walls and soffits in accordance with manufacturer's instructions.

B. Protect surfaces in contact with cementitious materials and dissimilar metals with bituminous paint. Allow to dry prior to installation.

C. Fasten panels to structural supports; aligned, level, and plumb.

D. Locate joints over supports.

E. Lap panel ends minimum 2 inches.

F. Provide expansion joints where indicated.

G. Use concealed fasteners unless otherwise approved by Architect.

H. Seal and place gaskets to prevent weather penetration. Maintain neat appearance.

### **3.04 TOLERANCES**

A. Maximum Offset From True Alignment Between Adjacent Members Butting or In Line: 1/16 inch.

B. Maximum Variation from Plane or Location Indicated on Drawings: 1/4 inch.



### **3.05 CLEANING**

- A. Remove site cuttings from finish surfaces.
- B. Remove protective material from wall panel surfaces.

**END OF SECTION**

**SECTION 07 46 23  
WOOD SIDING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Board siding for soffits.
- B. Trim, flashings, accessories, and fastenings.

**1.02 RELATED REQUIREMENTS**

**1.03 REFERENCE STANDARDS**

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- B. AWPA U1 - Use Category System: User Specification for Treated Wood 2018.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's data on materials, component profiles, fastening methods, jointing details, sizes, surface texture, finishes, and accessories; showing compliance with requirements, including:
  - 1. Physical characteristics of components shown on shop drawings.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation instructions and recommendations.
- C. Shop Drawings: Indicate dimensions, layout, joints, construction details, support clips, and methods of anchorage.
- D. Samples: Submit two samples 12 inches by 12 inches in size illustrating surface texture and finishes.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Wood Siding:
  - 1. Woodtone; Traditional Paneling; [www.woodtone.com](http://www.woodtone.com).
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 SIDING**

- A. Board Siding for Soffits: Flat with v-groove chamfered edges and ends, appearance grade spruce / pine / fir, maximum moisture content of 10 percent.
  - 1. Size: 1 inch by 6 inch nominal board.
  - 2. Surface Texture: Sanded.
  - 3. Preservative Treatment:  
Factory finished for exterior use, stain color to be selected by Architect.

**2.03 ACCESSORIES**

- A. Wood Sealer: Factory-applied, water-based polymer, water repellent sealer that reacts chemically with untreated, natural wood surfaces.
- B. Nails: Corrosion resistant type; non-staining, of size and strength to securely and rigidly retain the work ; prefinished to match siding finish.
- C. Exterior Soffit Vents: One piece, perforated, ASTM A653 galvanized steel with G90 coating, with edge suitable for direct application to board soffits and manufactured especially for soffit

application, and ventilation area shown on drawings..

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that substrates are ready to receive work.
- B. Do not begin until unacceptable conditions have been corrected.
- C. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

#### **3.02 INSTALLATION**

- A. Install siding in accordance with manufacturer's instructions.
- B. Fasten siding in place, level and plumb.
  - 1. Arrange for orderly nailing pattern, blind nail except over trim.
  - 2. Install siding for natural shed of water.
  - 3. Position cut ends over bearing surfaces, and sand cut edges smooth and clean.
  - 4. Miter internal and external corners tight at 45 degrees.
- C. Exterior Soffit Vents: Install according to manufacturer's written instructions, in locations indicated on drawings, and provide vent area specified.
- D. Sand work smooth and set exposed nails and screws.

#### **3.03 TOLERANCES**

- A. Maximum Variation From Plumb and Level: 1/4 inch per 10 feet.
- B. Maximum Offset From Joint Alignment: 1/16 inch.

**END OF SECTION**

**SECTION 07 46 46  
FIBER-CEMENT SIDING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fiber-cement siding.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 10 00 - Rough Carpentry: Siding substrate.
- B. Section 07 21 00: Insulation board under siding.
- C. Section 07 25 00 - Weather Barriers: Weather barrier under siding.
- D. Section 07 92 00 - Joint Sealants: Sealing joints between siding and adjacent construction and fixtures.

**1.03 REFERENCE STANDARDS**

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- B. ASTM C1186 - Standard Specification for Flat Fiber Cement Sheets 2008 (Reapproved 2016).

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Submit manufacturer's data sheets on each product to be used, including:
  - 1. Manufacturer's requirements for related materials to be installed by others.
  - 2. Preparation instructions and recommendations.
  - 3. Storage and handling requirements and recommendations.
  - 4. Installation methods, including nail patterns.
- C. Installer's Qualification Statement.
- D. Warranty Documentation for Installation of Building Rainscreen Assembly: Submit installer warranty and ensure that forms have been completed in Owner's name and registered with installer.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing work of the type specified in this section with minimum three years of experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Store products under waterproof cover and elevated above grade, on a flat surface.

**1.07 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Installation Warranty for Building Rainscreen Assembly: Installer of exterior rainscreen assembly (including air/vapor barrier and attachments, framing, and exterior panels) to provide 10-year warranty that includes coverage for defective materials and/or workmanship. This warranty will also clearly include materials, labor, necessary activity to access these areas, and removal of any materials to effect repairs and restore to watertight conditions.  
[www.edacontractors.com/#sle](http://www.edacontractors.com/#sle)

**PART 2 PRODUCTS**

**2.01 FIBER-CEMENT SIDING**

- A. Panel Siding: Vertically oriented panels and batten boards made of cement and cellulose fiber formed under high pressure with integral surface texture, complying with ASTM C1186, Type A, Grade II; with machined edges, for nail attachment.

1. Texture: Simulated cedar grain, vertically grooved.
2. Length (Height): 96 inches, nominal.
3. Width: 48 inches.
4. Thickness: 5/16 inch, nominal (siding) 3/4 inch nominal (batten boards).
5. Finish: Factory applied primer.
6. Warranty: 10 year limited; transferable.
7. Products:
  - a. James Hardie Building Products, Inc; HardiePanel Vertical Siding, Select Cedarmill: [www.jameshardie.com/#sle](http://www.jameshardie.com/#sle).
  - b. Substitutions: See Section 01 60 00 - Product Requirements.

## **2.02 ACCESSORIES**

- A. Cladding Support Clips: Thermally-broken, galvanized steel clips for support of cladding z-girts, angles, channels and other framing.
  1. Galvanized Steel Sheet: ASTM A653/A653M, with G90/Z275 galvanized coating.
- B. Furring Strips, Metal: Galvanized metal channels.
- C. Trim: Same material and texture as siding.
- D. Fasteners: Galvanized or corrosion resistant; length as required to penetrate, 1-1/4 inch, minimum.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrate, clean and repair as required to eliminate conditions that would be detrimental to proper installation.
- B. Verify that weather barrier has been installed over substrate completely and correctly.
- C. Do not begin until unacceptable conditions have been corrected.
- D. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### **3.02 PREPARATION**

- A. Install Sheet Metal Flashing:
  1. Above door and window trim and casings.

### **3.03 INSTALLATION**

- A. Install in accordance with manufacturer's instructions and recommendations.
  1. Read warranty and comply with terms necessary to maintain warranty coverage.
  2. Use trim details indicated on drawings.
  3. Touch up field cut edges before installing.
  4. Pre-drill nail holes if necessary to prevent breakage.
- B. Over Wood and Wood-Composite Sheathing: Fasten siding through sheathing into studs.
- C. Over Foam Sheathing: Read and comply with sheathing manufacturer's recommendations.
- D. Over Masonry Walls: Install preservative-treated wood furring strips of adequate thickness to accept full length of nails and spaced at 16 inches on center; leave space at top and bottom open; top may be behind soffit; at bottom install insect screen over opening by wrapping a strip of screen over bottom ends of vertical furring strips.
- E. Allow space for thermal movement between both ends of siding panels that butt against trim; seal joint between panel and trim with specified sealant.
- F. Joints in Vertical Siding: Install Z-flashing in horizontal joints between successive courses of vertical siding.

- G. Do not install siding less than 6 inches from surface of ground nor closer than 1 inch to roofs, patios, porches, and other surfaces where water may collect.
- H. After installation, seal joints except lap joints of lap siding; seal around penetrations, and paint exposed cut edges.

**END OF SECTION**

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**SECTION 07 54 23**  
**THERMOPLASTIC-POLYOLEFIN ROOFING (TPO) - FIRESTONE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Thermoplastic membrane roofing system, including components specified.
- B. Comply with published recommendations and instructions of roofing membrane manufacturer.
- C. Commencement of work by Contractor constitutes acknowledgement by Contractor that this specification can be satisfactorily executed, under the project conditions and with necessary prerequisites for warranty acceptance by roofing membrane manufacturer. No modification of the Contract Sum will be made for failure to adequately examine the Contract Documents or the project conditions.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 10 00 - Rough Carpentry: Wood nailers associated with roofing and roof insulation.
- B. Section 07 62 00 - Sheet Metal Flashing and Trim: Formed metal flashing and trim items associated with roofing.

**1.03 REFERENCE STANDARDS**

- A. ANSI/SPRI/FM 4435/ES-1 - Test Standard for Edge Systems Used with Low Slope Roofing Systems 2017.
- B. ASTM C177 - Standard Test Method for Steady-State Heat Flux Measurements and Thermal Transmission Properties by Means of the Guarded-Hot-Plate Apparatus 2019.
- C. ASTM C209 - Standard Test Methods for Cellulosic Fiber Insulating Board 2020.
- D. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus 2017.
- E. ASTM C1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board 2020.
- F. ASTM C1549 - Standard Test Method for Determination of Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer 2016.
- G. ASTM D638 - Standard Test Method for Tensile Properties of Plastics 2014.
- H. ASTM D1004 - Standard Test Method for Tear Resistance (Graves Tear) of Plastic Film and Sheeting 2013.
- I. ASTM D1621 - Standard Test Method for Compressive Properties Of Rigid Cellular Plastics 2016.
- J. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics 2020.
- K. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2016.
- L. ASTM D6878/D6878M - Standard Specification for Thermoplastic Polyolefin Based Sheet Roofing 2019.
- M. FM (AG) - FM Approval Guide current edition.
- N. FM 4470 - Approval Standard for Single-Ply, Polymer-Modified Bitumen Sheet, Built-Up Roof (BUR) and Liquid Applied Roof Assemblies for use in Class 1 and Noncombustible Roof Deck Construction 2016.
- O. FM DS 1-28 - Wind Design 2016.
- P. FM DS 1-29 - Roof Deck Securement and Above-Deck Roof Components 2016, with Editorial Revision (2020).
- Q. PS 1 - Structural Plywood 2009.



R. PS 20 - American Softwood Lumber Standard 2020.

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Pre-Installation Conference: Before start of roofing work, Contractor shall hold a meeting to discuss the proper installation of materials and requirements to achieve the warranty.
1. Require attendance by parties directly influencing quality of roofing work or affected by performance of roofing work.
  2. Notify Architect well in advance of meeting.

#### **1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data:
1. Provide membrane manufacturer's printed data sufficient to show that components of roofing system, including insulation and fasteners, comply with the specified requirements and with the membrane manufacturer's requirements and recommendations for the system type specified; include data for each product used in conjunction with roofing membrane.
- C. Samples: Submit samples of each product to be used.
- D. Shop Drawings: Provide:
1. The roof membrane manufacturer's standard details customized for this project for relevant conditions, including flashings, base tie-ins, roof edges, terminations, expansion joints, penetrations, and drains.
- E. Specimen Warranty: Submit prior to starting work.
- F. Installer Qualifications: Letter from manufacturer attesting that the roofing installer meets the specified qualifications.
- G. Executed Warranty.

#### **1.06 QUALITY ASSURANCE**

- A. Installer Qualifications: Provide roofing installer with the following:
1. Current approval, license, or authorization as applicator by the manufacturer.
  2. Fully staffed office within 100 miles of the job site.
  3. At least five years experience in installing specified system.

#### **1.07 DELIVERY, STORAGE AND HANDLING**

- A. Deliver products in manufacturer's original containers, dry and undamaged, with seals and labels intact and legible.
- B. Store materials clear of ground and moisture with weather protective covering.
- C. Keep combustible materials away from ignition sources.

#### **1.08 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals for additional warranty requirements.
- B. Comply with warranty procedures required by manufacturer, including notifications, scheduling, and inspections.
- C. Warranty: Warranty covering membrane, roof insulation, and other indicated components of the system, for 20-year term.
1. Limit of Liability: No dollar limitation.
  2. Scope of Coverage: Repair leaks in the roofing system caused by:
    - a. Ordinary wear and tear of the elements.
    - b. Manufacturing defect in materials.
    - c. Defective workmanship used to install these materials.
    - d. Damage due to winds up to 55 mph.

3. Not Covered:
  - a. Damage due to winds in excess of 90 mph.
  - b. Damage due hurricanes or tornadoes.
  - c. Hail.
  - d. Intentional damage.
  - e. Unintentional damage due to normal rooftop inspections, maintenance, or service.
- D. Metal Roof Edging: full-system warranty for roof edge system, covering blow-off from winds up to 150 mph.
- E. Metal Roof Edging with Exposed Decorative Fascia: Provide 20 year warranty for painted finish covering color fade, chalk, and film integrity.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Basis of Design Manufacturer - Roofing System: Firestone Building Products LLC, Nashville, TN: [www.firestonebpco.com/#sle](http://www.firestonebpco.com/#sle).
  1. Roofing systems manufactured by others are acceptable provided the roofing system is completely equivalent in materials and warranty conditions and the manufacturer meets the following qualifications:
    - a. Specializing in manufacturing the roofing system to be provided.
    - b. Minimum ten years of experience manufacturing the roofing system to be provided.
    - c. Roofing systems manufactured by the companies listed below are acceptable provided they are completely equivalent in materials and warranty conditions:
      - 1) Carlisle Syntec Systems; [www.carlisesyntec.com](http://www.carlisesyntec.com).
      - 2) GenFlex; [genflex.com](http://genflex.com).
      - 3) Mule-Hide Products; [www.mulehide.com](http://www.mulehide.com).
- B. Manufacturer of Insulation and Cover Boards: Same manufacturer as roof membrane.
- C. Manufacturer of Metal Roof Edging: Same manufacturer as roof membrane.
- D. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 ROOFING SYSTEM DESCRIPTION**

- A. Roofing System: Thermoplastic polyolefin (TPO) single-ply membrane.
  1. Membrane Attachment: Fully self-adhered.
  2. Warranty: Full system warranty; Firestone 20 year Limited Warranty covering membrane, roof insulation, and membrane accessories.
  3. Comply with applicable local building code requirements.
  4. Provide assembly having Underwriters Laboratories, Inc. (UL) Class A Fire Hazard Classification.
  5. Provide assembly complying with Factory Mutual Corporation (FM) Roof Assembly Classification, FM DS 1-28 and FM DS 1-29, and meeting minimum requirements of FM 1-90 wind uplift rating.
- B. Roofing System Components: Listed in order from top of roof down:
  1. Membrane: Thickness as specified.
  2. Base Sheet Over Insulation: Mechanically attached.
  3. Insulation Cover Board: High density polyisocyanurate; mechanically attached.
  4. Insulation:
    - a. Total R-value of 38, minimum.
    - b. Top Layer: Polyisocyanurate foam board, non-composite; mechanically fastened.
    - c. Bottom Layer: Polyisocyanurate foam board, non-composite; mechanically fastened.
    - d. Crickets: Tapered insulation of same type as specified for top layer; slope as indicated.

## 2.03 MEMBRANE MATERIALS

- A. Membrane: Flexible, heat weldable sheet composed of thermoplastic polyolefin polymer and ethylene propylene rubber; complying with ASTM D6878/D6878M, with polyester weft inserted reinforcement and the following additional characteristics:
  - 1. Thickness: 0.060 inch plus/minus 10 percent, with coating thickness over reinforcement of 0.024 inch plus/minus 10 percent.
  - 2. Puncture Resistance: 265 lbf, minimum, when tested in accordance with FTM 101C - Method 2031.
  - 3. Solar Reflectance: 0.43, minimum, when tested in accordance with ASTM C1549.
    - a. Membrane Color: Gray.
- B. Membrane Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.
- C. Curb and Parapet Flashing: Same material as membrane, with encapsulated edge which eliminates need for seam sealing the flashing-to-roof splice; precut to 18 inches wide.
- D. Formable Flashing: Non-reinforced, flexible, heat weldable sheet, composed of thermoplastic polyolefin polymer and ethylene propylene rubber.
  - 1. Thickness: 0.060 inch plus/minus 10 percent.
  - 2. Tensile Strength: 1,550 psi, minimum, when tested in accordance with ASTM D638 after heat aging.
  - 3. Elongation at Break: 650 percent, minimum, when tested in accordance with ASTM D638 after heat aging.
  - 4. Tearing Strength: 12 lbf, minimum, when tested in accordance with ASTM D1004 after heat aging.
  - 5. Color: Match roofing membrane.
- E. Tape Flashing: 5-1/2 inches nominal wide TPO membrane laminated to cured rubber polymer seaming tape, overall thickness 0.065 inch nominal; TPO QuickSeam Flashing by Firestone.
- F. Pourable Sealer: Two-part polyurethane, two-color for reliable mixing; Pourable Sealer by Firestone.
- G. Seam Plates: Steel with barbs and Galvalume coating; corrosion-resistance complying with FM 4470.
- H. Termination Bars: Aluminum bars with integral caulk ledge; 1.3 inches wide by 0.10 inch thick; Firestone Termination Bar by Firestone.
- I. Cut Edge Sealant: Synthetic rubber-based, for use where membrane reinforcement is exposed; available in white, gray, and tan; UltraPly TPO Cut Edge Sealant by Firestone.
- J. General Purpose Sealant: EPDM-based, one part, white general purpose sealant; UltraPly TPO General Purpose Sealant by Firestone.
- K. Molded Flashing Accessories: Unreinforced TPO membrane pre-molded to suit a variety of flashing details, including pipe boots, inside corners, outside corners, etc.; UltraPly TPO Small and Large Pipe Flashing by Firestone.
- L. Roof Walkway Pads: Non-reinforced TPO walkway pads, 0.130 inch by 30 inches by 40 feet long with patterned traffic bearing surface; UltraPly TPO Walkway Pads by Firestone.

## 2.04 ROOF INSULATION AND COVER BOARDS

- A. Polyisocyanurate Board Insulation: Closed cell polyisocyanurate foam with glass reinforced mat laminated to faces, complying with ASTM C1289 Type II Class 1, and the following additional characteristics:
  - 1. Thickness: As indicated elsewhere.
  - 2. Size: 48 inches by 96 inches, nominal.

- a. Exception: Insulation to be attached using adhesive or asphalt may be no larger than 48 inches by 48 inches, nominal.
- 3. R-value (LTTR):
  - a. 1.0 inch Thickness: 6.0, minimum.
  - b. 1.25 inch Thickness: 7.5, minimum.
  - c. 1.5 inch Thickness: 9.0, minimum.
  - d. 1.75 inch Thickness: 10.5, minimum.
  - e. 2.0 inch Thickness: 12.1, minimum.
  - f. 3.0 inch Thickness: 18.5, minimum.
  - g. 4.0 inch Thickness: 25.0, minimum.
- 4. Compressive Strength: 20 psi when tested in accordance with ASTM C1289.
- 5. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
- 6. Recycled Content: 19 percent post-consumer and 15 percent pre-consumer (post-industrial), average.
- B. High Density Polyisocyanurate Cover Board: Non-combustible, water resistant, high density closed cell polyisocyanurate core with coated glass mat facers, and the following characteristics:
  - 1. Size: 48 inches by 96 inches, nominal.
  - 2. Thickness: 1/2 inch.
  - 3. Thermal Value: R-value of 2.5, when tested in accordance with ASTM C518 and ASTM C177.
  - 4. Surface Water Absorption: 3 percent, maximum, when tested in accordance with ASTM C209.
  - 5. Compressive Strength: 120 psi, when tested in accordance with ASTM D1621.
  - 6. Density: 5 pcf, when tested in accordance with ASTM D1622.
  - 7. Factory Mutual approved for use with FM 1-60 and 1-90 rated roofing assemblies.
  - 8. Mold Growth Resistance: Passing ASTM D3273.
- C. Insulation Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.

## 2.05 METAL ACCESSORIES

- A. Metal Roof Edging and Fascia: Continuous metal edge member serving as termination of roof membrane and retainer for metal fascia; watertight with no exposed fasteners; mounted to roof edge nailer.
  - 1. Wind Performance:
    - a. Membrane Pull-Off Resistance: 100 lb/ft, minimum, when tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-1.
    - b. Fascia Pull-Off Resistance: At least minimum required when tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-2.
    - c. Provide product listed in FM (AG) with at least FM 1-270 rating.
  - 2. Fascia Face Height: see details inches.
  - 3. Edge Member Height Above Nailers: see details inches.
  - 4. Fascia Material and Finish: 24 gauge, 0.024 inch galvanized steel with Kynar 500 finish in manufacturer's standard color; matching concealed joint splice plates; factory-installed protective plastic film.
  - 5. Length: maximum practical inches.
  - 6. Functional Characteristics: Fascia retainer supports while allowing for free thermal cycling of fascia.
  - 7. Aluminum Bar: Continuous 6063-T6 alloy aluminum extrusion with pre-punched slotted holes; miters welded; injection molded EPDM splices to allow thermal expansion.
  - 8. Anchor Bar Cleat: 20 gauge, 0.036 inch G90 coated commercial type galvanized steel with pre-punched holes.

9. Curved Applications: Factory modified.
  10. Fasteners: Factory-provided corrosion resistant fasteners, with drivers; no exposed fasteners permitted.
  11. Special Shaped Components: Provide factory-fabricated pieces necessary for complete installation, including miters, scuppers, and end caps; minimum 14-inch long legs on corner pieces.
  12. Scuppers: Welded watertight.
  13. Accessories: Provide matching brick wall cap, downspout, extenders, and other special fabrications as shown on the drawings.
- B. Parapet Copings: Formed metal coping with galvanized steel anchor/support cleats for capping any parapet wall; watertight, maintenance free, without exposed fasteners; butt type joints with concealed splice plates; mechanically fastened as indicated; Firestone PTCF.
1. Wind Performance:
    - a. At least minimum required when tested in accordance with ANSI/SPRI/FM 4435/ES-1 using test method RE-3.
    - b. Provide product listed in FM (AG) with at least FM 1-90 rating.
  2. Description: Coping sections allowed to expand and contract freely while locked in place on anchor cleats by mechanical pressure from hardened stainless steel springs factory attached to anchor cleats; 8-inch wide splice plates with factory applied dual non-curing sealant strips capable of providing watertight seal.
  3. Material and Finish: 24 gauge, 0.024 inch thick galvanized steel with Kynar 500 finish in manufacturer's standard color; matching concealed joint splice plates; factory-installed protective plastic film.
  4. Dimensions:
    - a. Wall Width: As indicated on the drawings.
    - b. Piece Length: Minimum 144 inches.
    - c. Curved Application: Factory fabricated in true radius.
  5. Anchor/Support Cleats: 20 gauge, 0.036 inch thick prepunched galvanized cleat with 12 inch wide stainless steel spring mechanically locked to cleat at 72 inches on center.
  6. Special Shaped Components: Provide factory-fabricated pieces necessary for complete installation, including miters, corners, intersections, curves, pier caps, and end caps; minimum 14 inch long legs on corner, intersection, and end pieces.
  7. Fasteners: Factory-furnished; electrolytically compatible; minimum pull out resistance of 240 lb for actual substrate used; no exposed fasteners.

## 2.06 ACCESSORIES

- A. Rib Contours.
1. Decorative TPO rib contours, spaced at 18 inches on center, fully adhered to roofing membrane to simulate the appearance of a standing seam metal roofing system.

## PART 3 INSTALLATION

### 3.01 GENERAL

- A. Install roofing, insulation, flashings, and accessories in accordance with roofing manufacturer's published instructions and recommendations for the specified roofing system. Where manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations.
- B. Obtain relevant instructions and maintain copies at project site for duration of installation period.
- C. Do not start work until Pre-Installation Notice has been submitted to manufacturer as notification that this project requires a manufacturer's warranty.
- D. Perform work using competent and properly equipped personnel.

- E. Temporary closures, which ensure that moisture does not damage any completed section of new roofing system, are responsibility of applicator. Completion of flashings, terminations, and temporary closures to be completed as required to provide a watertight condition.
- F. Install roofing membrane only when surfaces are clean, dry, smooth and free of snow or ice; do not apply roofing membrane during inclement weather or when ambient conditions will not allow proper application; consult manufacturer for recommended procedures during cold weather. Do not work with sealants and adhesives when material temperature is outside the range of 60 to 80 degrees F.
- G. Protect adjacent construction, property, vehicles, and persons from damage related to roofing work; repair or restore damage caused by roofing work.
  - 1. Protect from spills and overspray from bitumen, adhesives, sealants and coatings.
  - 2. Particularly protect metal, glass, plastic, and painted surfaces from bitumen, adhesives, and sealants within the range of wind-borne overspray.
  - 3. Protect finished areas of the roofing system from roofing related work traffic and traffic by other trades.
- H. Until ready for use, keep materials in their original containers as labeled by the manufacturer.
- I. Comply with membrane manufacturer's instructions, container labels, and Material Safety Data Sheets (MSDS) for specific safety instructions. Keep adhesives, sealants, primers and cleaning materials away from sources of ignition.

### **3.02 EXAMINATION**

- A. Examine roof deck to determine that it is sufficiently rigid to support installers and their mechanical equipment and that deflection will not strain or rupture roof components or deform deck.
- B. Verify that surfaces and site conditions are ready to receive work. Correct defects in the substrate before commencing with roofing work.
- C. Examine roof substrate to verify that it is properly sloped to drains.
- D. Verify that the specifications and drawing details are workable and not in conflict with the roofing manufacturer's recommendations and instructions; start of work constitutes acceptable of project conditions and requirements.

### **3.03 PREPARATION**

- A. Take appropriate measures to ensure that fumes from adhesive solvents are not drawn into the building through air intakes.
- B. Prior to proceeding, prepare roof surface so that it is clean, dry, and smooth, and free of sharp edges, fins, roughened surfaces, loose or foreign materials, oil, grease and other materials that may damage the membrane.
- C. Fill surface voids in immediate substrate that are greater than 1/4 inch wide with fill material acceptable insulation to membrane manufacturer.
- D. Seal, grout, or tape deck joints, where needed, to prevent bitumen seepage into building.
- E. Wood Nailers: Provide wood nailers at perimeters and other locations where indicated on drawings, of total height matching total thickness of insulation being used.

### **3.04 INSULATION AND COVER BOARD INSTALLATION**

- A. Install insulation in configuration and with attachment method(s) specified in PART 2, under Roofing System.
- B. Install only as much insulation as can be covered with the completed roofing system before the end of the day's work or before the onset of inclement weather.
- C. Lay roof insulation in courses parallel to roof edges.

- D. Neatly and tightly fit insulation to penetrations, projections, and nailers, with gaps not greater than 1/4 inch. Fill gaps greater than 1/4 inch with acceptable insulation. Do not leave roofing membrane unsupported over a space greater than 1/4 inch wide.
- E. Mechanical Fastening: Using specified fasteners and insulation plates engage fasteners through insulation into deck to depth and in pattern required by Factory Mutual for FM Class specified in PART 2 and membrane manufacturer, whichever is more stringent.

### **3.05 SINGLE-PLY MEMBRANE INSTALLATION**

- A. Beginning at low point of roof, place membrane without stretching over substrate and allow to relax at least 30 minutes before attachment or splicing; in colder weather allow for longer relax time.
- B. Lay out the membrane pieces so that field and flashing splices are installed to shed water.
- C. Install membrane without wrinkles and without gaps or fishmouths in seams; bond and test seams and laps in accordance with membrane manufacturer's instructions and details.
- D. Install membrane adhered to the substrate, with edge securement as specified.
- E. Adhered Membrane: Bond membrane sheet to substrate using membrane manufacturer's recommended bonding material, application rate, and procedures.
- F. Edge Securement: Secure membrane at locations where membrane terminates or goes through an angle change greater than 2 in 12 inches using mechanically fastened reinforced perimeter fastening strips, plates, or metal edging as indicated or as recommended by roofing manufacturer.
  - 1. Exceptions: Round pipe penetrations less than 18 inches in diameter and square penetrations less than 4 inches square.
  - 2. Metal edging is not merely decorative; ensure anchorage of membrane as intended by roofing manufacturer.

### **3.06 FLASHING AND ACCESSORIES INSTALLATION**

- A. Install flashings, including laps, splices, joints, bonding, adhesion, and attachment, as required by membrane manufacturer's recommendations and details.
- B. Metal Accessories: Install metal edgings, gravel stops, and copings in locations indicated on the drawings, with horizontal leg of edge member over membrane and flashing over metal onto membrane.
  - 1. Follow roofing manufacturer's instructions.
  - 2. Remove protective plastic surface film immediately before installation.
  - 3. Install water block sealant under the membrane anchorage leg.
  - 4. Flash with manufacturer's recommended flashing sheet unless otherwise indicated.
  - 5. Where single application of flashing will not completely cover the metal flange, install additional piece of flashing to cover the metal edge.
  - 6. If the roof edge includes a gravel stop and sealant is not applied between the laps in the metal edging, install an additional piece of self-adhesive flashing membrane over the metal lap to the top of the gravel stop; apply seam edge treatment at the intersections of the two flashing sections.
  - 7. When the roof slope is greater than 1:12, apply seam edge treatment along the back edge of the flashing.
- C. Flashing at Walls, Curbs, and Other Vertical and Sloped Surfaces: Install weathertight flashing at walls, curbs, parapets, skylights, and other vertical and sloped surfaces that roofing membrane abuts to; extend flashing at least 8 inches high above membrane surface.
  - 1. Use longest practical flashing pieces.
  - 2. Evaluate the substrate and overlay and adjust installation procedure in accordance with membrane manufacturer's recommendations.

3. Complete the splice between flashing and the main roof sheet with specified splice adhesive before adhering flashing to the vertical surface.
  4. Provide termination directly to the vertical substrate as shown on roof drawings.
- D. Roof Drains:
1. Taper insulation around drain to provide smooth transition from roof surface to drain. Use specified pre-manufactured tapered insulation with facer or suitable bonding surface to achieve slope; slope not to exceed manufacturer's recommendations.
  2. Position membrane, then cut a hole for roof drain to allow 1/2 to 3/4 inch of membrane to extend inside clamping ring past drain bolts.
  3. Make round holes in membrane to align with clamping bolts; do not cut membrane back to bolt holes.
  4. Apply sealant on top of drain bowl where clamping ring seats below the membrane
  5. Install roof drain clamping ring and clamping bolts; tighten clamping bolts to achieve constant compression.
- E. Flashing at Penetrations: Flash penetrations passing through membrane; make flashing seals directly to penetration.
1. Pipes, Round Supports, and Similar Items: Flash with specified pre-molded pipe flashings wherever practical; otherwise use specified self-curing elastomeric flashing.
  2. Pipe Clusters and Unusual Shaped Penetrations: Provide penetration pocket at least 2 inches deep, with at least 1 inch clearance from penetration, sloped to shed water.

### **3.07 FINISHING AND WALKWAY INSTALLATION**

- A. Install walkways at access points to the roof, around rooftop equipment that may require maintenance, and where indicated on the drawings.
- B. Walkway Pads: Adhere to the roofing membrane, spacing each pad at minimum of 1 inch and maximum of 3 inches from each other to allow for drainage.
  1. If installation of walkway pads over field fabricated splices or within 6 inches of a splice edge cannot be avoided, adhere another layer of flashing over the splice and extending beyond the walkway pad a minimum of 6 inches on either side.
  2. Prime the membrane, remove the release paper on the pad, press in place, and walk on pad to ensure proper adhesion.

### **3.08 FIELD QUALITY CONTROL**

- A. Inspection by Manufacturer: Provide final inspection of the roofing system by a Technical Representative employed by roofing system manufacturer specifically to inspect installation for warranty purposes (i.e. not a sales person).
- B. Perform corrections necessary for issuance of warranty.

### **3.09 CLEANING**

- A. Clean contaminants generated by roofing work from building and surrounding areas including bitumen, adhesives, sealants, and coatings.
- B. Repair or replace building components and finished surfaces damaged or defaced due to the work of this section; comply with recommendations of manufacturers of components and surfaces.
- C. Remove leftover materials, trash, debris, equipment from project site and surrounding areas.

### **3.10 PROTECTION**

- A. Where construction traffic must continue over finished roof membrane, provide durable protection and replace or repair damaged roofing to original condition.

### **END OF SECTION**



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**SECTION 07 62 00  
SHEET METAL FLASHING AND TRIM**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fabricated sheet metal items, including flashings, counterflashings, gutters, and downspouts.
- B. Sealants for joints within sheet metal fabrications.

**1.02 REFERENCE STANDARDS**

- A. AAMA 2605 - Voluntary Specification, Performance Requirements and Test Procedures for Superior Performing Organic Coatings on Aluminum Extrusions and Panels (with Coil Coating Appendix) 2017a.
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- C. SMACNA (ASMM) - Architectural Sheet Metal Manual 2012.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Shop Drawings: Indicate material profile, jointing pattern, jointing details, fastening methods, flashings, terminations, and installation details.
- C. Samples: Submit two samples 12 by 12 inch in size illustrating metal finish color.

**1.04 QUALITY ASSURANCE**

- A. Perform work in accordance with SMACNA (ASMM) and CDA A4050 requirements and standard details, except as otherwise indicated.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Stack material to prevent twisting, bending, and abrasion, and to provide ventilation. Slope metal sheets to ensure drainage.
- B. Prevent contact with materials that could cause discoloration or staining.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Sheet Metal Flashing and Trim Manufacturers:
  - 1. Same as Section 07 42 13 - Metal Wall Panels.
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 SHEET MATERIALS**

- A. Pre-Finished Galvanized Steel: ASTM A653/A653M, with G90/Z275 zinc coating; minimum 24 gauge, (0.0239) inch thick base metal, shop pre-coated with PVDF coating.
  - 1. PVDF (Polyvinylidene Fluoride) Coating: Superior Performance Organic Finish, AAMA 2605; multiple coat, thermally cured fluoropolymer finish system.
  - 2. Color: As selected by Architect from manufacturer's standard colors.

**2.03 FABRICATION**

- A. Form sections true to shape, accurate in size, square, and free from distortion or defects.
- B. Form pieces in longest possible lengths.
- C. Hem exposed edges on underside 1/2 inch; miter and seam corners.
- D. Form material with flat lock seams, except where otherwise indicated; at moving joints, use sealed lapped, bayonet-type or interlocking hooked seams.
- E. Fabricate corners from one piece with minimum 18 inch long legs; seam for rigidity, seal with sealant.

- F. Fabricate flashings to allow toe to extend 2 inches over roofing gravel. Return and brake edges.

#### **2.04 GUTTER AND DOWNSPOUT FABRICATION**

- A. Gutters: Profile as indicated.
- B. Downspouts: Profile as indicated.
- C. Gutters and Downspouts: Size indicated.
- D. Accessories: Profiled to suit gutters and downspouts.
- E. Seal metal joints.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify roof openings, curbs, pipes, sleeves, ducts, and vents through roof are solidly set, reglets in place, and nailing strips located.
- B. Verify roofing termination and base flashings are in place, sealed, and secure.

#### **3.02 PREPARATION**

- A. Install starter and edge strips, and cleats before starting installation.
- B. Back paint concealed metal surfaces with protective backing paint to a minimum dry film thickness of 15 mil.

#### **3.03 INSTALLATION**

- A. Secure flashings in place using concealed fasteners, and use exposed fasteners only where permitted..
- B. Fit flashings tight in place; make corners square, surfaces true and straight in planes, and lines accurate to profiles.
- C. Seal metal joints watertight.
- D. Secure gutters and downspouts in place with concealed fasteners.

**END OF SECTION**

**SECTION 07 92 00  
JOINT SEALANTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Nonsag gunnable joint sealants.
- B. Self-leveling pourable joint sealants.
- C. Joint backings and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 25 00 - Weather Barriers: Sealants required in conjunction with air barriers and vapor retarders.
- B. Section 08 71 00 - Door Hardware: Setting exterior door thresholds in sealant.
- C. Section 08 80 00 - Glazing: Glazing sealants and accessories.
- D. Section 09 21 16 - Gypsum Board Assemblies: Sealing acoustical and sound-rated walls and ceilings.

**1.03 REFERENCE STANDARDS**

- A. ASTM C834 - Standard Specification for Latex Sealants 2017.
- B. ASTM C920 - Standard Specification for Elastomeric Joint Sealants 2018.
- C. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- D. ASTM C1248 - Standard Test Method for Staining of Porous Substrate by Joint Sealants 2018.
- E. ASTM C1311 - Standard Specification for Solvent Release Sealants 2014.
- F. ASTM C1330 - Standard Specification for Cylindrical Sealant Backing for Use with Cold Liquid-Applied Sealants 2018.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data for Sealants: Submit manufacturer's technical data sheets for each product to be used, that includes the following.
  - 1. Physical characteristics, including movement capability, VOC content, hardness, cure time, and color availability.
  - 2. List of backing materials approved for use with the specific product.
  - 3. Substrates that product is known to satisfactorily adhere to and with which it is compatible.
  - 4. Substrates the product should not be used on.
- C. Color Cards for Selection: Where sealant color is not specified, submit manufacturer's color cards showing standard colors available for selection.

**1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing the work of this section and with at least three years of documented experience.

**1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for installed sealants and accessories that fail to achieve watertight seal, exhibit loss of adhesion or cohesion, or do not cure.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Non-Sag Sealants: Permits application in joints on vertical surfaces without sagging or slumping.
- B. Self-Leveling Sealants: Pourable or self-leveling sealant that has sufficient flow to form a smooth, level surface when applied in a horizontal joint.

### **2.02 JOINT SEALANT APPLICATIONS**

- A. Scope:
  - 1. Exterior Joints: Seal open joints, whether or not the joint is indicated on drawings, unless specifically indicated not to be sealed. Exterior joints to be sealed include, but are not limited to, the following items.
    - a. Wall expansion and control joints.
    - b. Joints between door, window, and other frames and adjacent construction.
    - c. Joints between different exposed materials.
    - d. Openings below ledge angles in masonry.
    - e. Other joints indicated below.
  - 2. Interior Joints: Do not seal interior joints unless specifically indicated to be sealed. Interior joints to be sealed include, but are not limited to, the following items.
    - a. Joints between door, window, and other frames and adjacent construction.
    - b. Other joints indicated below.
  - 3. Do not seal the following types of joints.
    - a. Intentional weepholes in masonry.
    - b. Joints indicated to be treated with manufactured expansion joint cover or some other type of sealing device.
    - c. Joints where sealant is specified to be provided by manufacturer of product to be sealed.
    - d. Joints where installation of sealant is specified in another section.
    - e. Joints between suspended panel ceilings/grid and walls.
- B. Type EX - Exterior Joints: Use non-sag non-staining silicone sealant, unless otherwise indicated.
  - 1. Type EX-SM - Lap Joints in Sheet Metal Fabrications: Butyl rubber, non-curing.
  - 2. Type EX-P - Control and Expansion Joints in Concrete Paving: Self-leveling polyurethane "traffic-grade" sealant.
- C. Type IN - Interior Joints: Use non-sag polyurethane sealant, unless otherwise indicated.
  - 1. Type IN-WD - Wall and Ceiling Joints in Non-Wet Areas: Acrylic emulsion latex sealant.
  - 2. Type IN-WW - Wall and Ceiling Joints in Wet Areas: Non-sag polyurethane sealant for continuous liquid immersion.
  - 3. Type IN-FW - Floor Joints in Wet Areas: Non-sag polyurethane "non-traffic-grade" sealant suitable for continuous liquid immersion.
  - 4. Type IN-F - Joints between Fixtures in Wet Areas and Floors, Walls, and Ceilings: Mildew-resistant silicone sealant; white.
- D. Interior Wet Areas: Bathrooms, restrooms, and kitchens; fixtures in wet areas include plumbing fixtures, countertops, cabinets, and other similar items.

### **2.03 NONSAG JOINT SEALANTS**

- A. Non-Staining Silicone Sealant: ASTM C920, Grade NS, Uses M and A; not expected to withstand continuous water immersion or traffic.
  - 1. Movement Capability: Plus and minus 25 percent, minimum.
  - 2. Non-Staining To Porous Stone: Non-staining to light-colored natural stone when tested in accordance with ASTM C1248.

3. Dirt Pick-Up: Reduced dirt pick-up compared to other silicone sealants.
4. Color: To be selected by Architect from manufacturer's standard range.
5. Manufacturers:
  - a. Dow Chemical Company; DOWSIL 795 Silicone Building Sealant: [consumer.dow.com/en-us/industry/ind-building-construction.html/#sle](http://consumer.dow.com/en-us/industry/ind-building-construction.html/#sle).
  - b. Pecora Corporation; Pecora 864 NST (Non-Staining Technology): [www.pecora.com/#sle](http://www.pecora.com/#sle).
  - c. Sika Corporation; Sikasil WS-295: [www.usa-sika.com/#sle](http://www.usa-sika.com/#sle).
  - d. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Mildew-Resistant Silicone Sealant: ASTM C920, Grade NS, Uses M and A; single component, mildew resistant; not expected to withstand continuous water immersion or traffic.
  1. Color: Clear.
  2. Manufacturers:
    - a. Pecora Corporation; Pecora 898 NST (Non-Staining Technology): [www.pecora.com/#sle](http://www.pecora.com/#sle).
    - b. Sika Corporation; Sikasil GP: [www.usa-sika.com/#sle](http://www.usa-sika.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Polyurethane Sealant: ASTM C920, Grade NS, Uses M and A; single or multi-component; not expected to withstand continuous water immersion or traffic.
  1. Movement Capability: Plus and minus 12.5 percent, minimum.
  2. Color: To be selected by Architect from manufacturer's standard range.
  3. Manufacturers:
    - a. Pecora Corporation; DynaFlex: [www.pecora.com/#sle](http://www.pecora.com/#sle).
    - b. Sika Corporation; Sikaflex-1a: [www.usa-sika.com/#sle](http://www.usa-sika.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Polyurethane Sealant for Continuous Water Immersion: ASTM C920, Grade NS, Uses M and A; single or multi-component; explicitly approved by manufacturer for continuous water immersion; suitable for traffic exposure when recessed below traffic surface.
  1. Movement Capability: Plus and minus 35 percent, minimum.
  2. Color: To be selected by Architect from manufacturer's standard range.
- E. Acrylic Emulsion Latex: Water-based; ASTM C834, single component, non-staining, non-bleeding, non-sagging; not intended for exterior use.
  1. Color: To be selected by Architect from manufacturer's standard range.
  2. Grade: ASTM C834; Grade Minus 18 Degrees C (0 Degrees F).
  3. Manufacturers:
    - a. Pecora Corporation; AC-20 +Silicone: [www.pecora.com/#sle](http://www.pecora.com/#sle).
    - b. Sherwin-Williams Company; 950A Siliconized Acrylic Latex Caulk: [www.sherwin-williams.com/#sle](http://www.sherwin-williams.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.
- F. Non-Curing Butyl Sealant: Solvent-based, single component, non-sag, non-skinning, non-hardening, non-bleeding; non-vapor-permeable; intended for fully concealed applications.
  1. Manufacturers:
    - a. Pecora Corporation; Pecora BA-98 Non-Skinning Butyl Sealant: [www.pecora.com/#sle](http://www.pecora.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.

## 2.04 SELF-LEVELING SEALANTS

- A. Self-Leveling Polyurethane Sealant: ASTM C920, Grade P, Uses M and A; single or multi-component; explicitly approved by manufacturer for traffic exposure; not expected to withstand continuous water immersion .
  1. Movement Capability: Plus and minus 25 percent, minimum.
  2. Color: Gray.

3. Service Temperature Range: Minus 40 to 180 degrees F.
4. Manufacturers:
  - a. Sika Corporation; Sikaflex-1c SL: [www.usa-sika.com/#sle](http://www.usa-sika.com/#sle).
  - b. Substitutions: See Section 01 60 00 - Product Requirements.

## **2.05 ACCESSORIES**

- A. Backer Rod: Cylindrical cellular foam rod with surface that sealant will not adhere to, compatible with specific sealant used, and recommended by backing and sealant manufacturers for specific application.
  1. Type for Joints Not Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type O - Open Cell Polyurethane.
  2. Type for Joints Subject to Pedestrian or Vehicular Traffic: ASTM C1330; Type B - Bi-Cellular Polyethylene.
  3. Open Cell: 40 to 50 percent larger in diameter than joint width.
  4. Closed Cell and Bi-Cellular: 25 to 33 percent larger in diameter than joint width.
- B. Backing Tape: Self-adhesive polyethylene tape with surface that sealant will not adhere to and recommended by tape and sealant manufacturers for specific application.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that joints are ready to receive work.
- B. Verify that backing materials are compatible with sealants.
- C. Verify that backer rods are of the correct size.

### **3.02 PREPARATION**

- A. Remove loose materials and foreign matter that could impair adhesion of sealant.
- B. Clean joints, and prime as necessary, in accordance with manufacturer's instructions.
- C. Perform preparation in accordance with manufacturer's instructions and ASTM C1193.
- D. Mask elements and surfaces adjacent to joints from damage and disfigurement due to sealant work; be aware that sealant drips and smears may not be completely removable.

### **3.03 INSTALLATION**

- A. Perform work in accordance with sealant manufacturer's requirements for preparation of surfaces and material installation instructions.
- B. Perform installation in accordance with ASTM C1193.
- C. Install bond breaker backing tape where backer rod cannot be used.
- D. Install sealant free of air pockets, foreign embedded matter, ridges, and sags, and without getting sealant on adjacent surfaces.
- E. Do not install sealant when ambient temperature is outside manufacturer's recommended temperature range, or will be outside that range during the entire curing period, unless manufacturer's approval is obtained and instructions are followed.
- F. Nonsag Sealants: Tool surface concave, unless otherwise indicated; remove masking tape immediately after tooling sealant surface.

**END OF SECTION**

**SECTION 08 06 71  
DOOR HARDWARE SCHEDULE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Preliminary schedule of door hardware sets for swinging and sectional as indicated on drawings.

**1.02 RELATED REQUIREMENTS**

- A. Section 08 71 00 - Door Hardware: Requirements to comply with in coordination with this section.

**1.03 REFERENCE STANDARDS**

- A. BHMA A156.3 - American National Standard for Exit Devices 2014.
- B. BHMA A156.5 - American National Standard for Cylinders and Input Devices for Locks 2014.
- C. BHMA A156.18 - American National Standard for Materials and Finishes 2016.
- D. DHI (H&S) - Sequence and Format for the Hardware Schedule 1996.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Comply with submittal requirements as indicated in Section 08 71 00.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Only manufacturers listed in Door Hardware Schedule or Section 08 71 00 are considered acceptable, unless noted otherwise.
- B. Obtain each type of door hardware as indicated from a single manufacturer and single supplier.
- C. Manufacturer's Abbreviations: Coordinate with manufacturers listed in Section 08 71 00.

**2.02 DESCRIPTION**

- A. Door hardware sets provided represent the design intent, they are only a guideline and should not be considered a detailed or complete hardware schedule.
  - 1. Provide door hardware item(s) as required for similar purposes, even when item is not listed for a door in Door Hardware Schedule.
  - 2. Necessary items that are not included in a Hardware Set should be added and have the appropriate additional hardware as required for proper application and functionality.
  - 3. Door hardware supplier is responsible for providing proper size and hand of door for products required in accordance with Door Hardware Schedule and as indicated on drawings.
  - 4. Quantities listed are for each Pair (PR) of doors, or for each Single (SGL) door, as indicated in hardware sets.

**2.03 LOCK FUNCTION CODES**

- A. Function Codes for Cylindrical Locks: Complying with BHMA A156.5.
- B. Function Codes for Exit Devices: Complying with BHMA A156.3.

**2.04 FINISHES**

- A. Finishes: Complying with BHMA A156.18.

**PART 3 EXECUTION**

**3.01 DOOR HARDWARE SCHEDULE**

- A. Organize listing of door hardware components within each hardware set in compliance with 10-Part scheduling sequence indicated in DHI (H&S), unless otherwise indicated.



B. Refer to detailed hardware set list that follows.

**END OF SECTION**

**HARDWARE GROUP NO. AL-01**

For use on mark/ door #(s):

100

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	PANIC HARDWARE	98-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	90 DEG OFFSET PULL	8190HD 10" O	630	IVE
1	EA	OH STOP	100S ADJ	630	GLY
1	SET	SEALS	BY ALUM DOOR/ FRAME MFR		
1	EA	DOOR SWEEP	BY ALUM DOOR/ FRAME MFR		
1	EA	THRESHOLD	BY ALUM DOOR/ FRAME MFR		
1	EA	ELEC STRIKE	5100	689	VON
1	EA	MULTITECH READER	BY SECURITY CONTRACTOR – MTK15	BLK	SCE
1	EA	DOOR CONTACT	BY SECURITY CONTRACTOR – 679-05	BLK	SCE
1	EA	POWER SUPPLY	BY SECURITY CONTRACTOR – PS902 900-2RS	LGR	VON
1	SET	WIRING DIAGRAMS	AS REQ'D		

A) Architect to determine card reader locations.

**OPERATIONAL DESCRIPTION**

1. Free egress at all times.
2. During business hours, access control system time clock electrically keeps latch retracted, allowing entry.
3. During non-business hours, authorized credential momentarily retracts latchbolt, allowing entry.
4. RX switch (integral to locking hardware) monitors authorized egress.
5. Door contact monitors when door opens and closes.
6. On loss of power, electrified hardware is disabled. Door remains in current latched state. Trim remains secure.
7. Opening requires integration with access control system.

**HARDWARE GROUP NO. AL-02**

For use on mark/ door #(s):

107

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
1	EA	CONT. HINGE	112HD	628	IVE
1	EA	PANIC HARDWARE	98-NL-OP-110MD	626	VON
1	EA	RIM CYLINDER	1E72	626	BES
1	EA	90 DEG OFFSET PULL	8190HD 10" O	630	IVE
1	EA	OH STOP	100S ADJ	630	GLY
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	PA MOUNTING PLATE	4040XP-18PA AS REQ'D	689	LCN
1	SET	SEALS	BY ALUM DOOR/ FRAME MFR		
1	EA	DOOR SWEEP	BY ALUM DOOR/ FRAME MFR		
1	EA	THRESHOLD	BY ALUM DOOR/ FRAME MFR		

**HARDWARE GROUP NO. AL-03** (interior passage double door)

For use on mark/ door #(s):

133

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
2	EA	CONT. HINGE	112HD	628	IVE
2	EA	DUMMY PUSH BAR (W/ DUMMY PULL TRIM)	350-DT-900	626	VON
2	EA	OH STOP	100S ADJ	630	GLY
1	SET	GASKETING AT HEAD AND JAMBS		BK	ZER

**HARDWARE GROUP NO. 01** (exterior HM)

For use on mark/ door #(s):

120 121 130B

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
1	SET	HINGE	5BB1 (QTY, WEIGHT, SIZE, NRP AS REQ'D)	652	IVE
1	EA	STOREROOM LOCK	ND80BD RHO	626	SCH
1	EA	PERMANENT CORE	1C-7	626	BES
1	EA	SURFACE CLOSER (W/ SPRING STOP)	4040XP SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" B-CS	630	IVE
1	EA	RAIN DRIP	142AA	AL	ZER
1	SET	GASKETING	429 AT HEAD AND JAMBS	CLR	ZER
1	EA	DOOR SWEEP	39A	AL	ZER
1	EA	THRESHOLD	655A	AL	ZER
1	EA	ELEC STRIKE	5100	689	VON
1	EA	MULTITECH READER	BY SECURITY CONTRACTOR – MTK15	BLK	SCE
1	EA	DOOR CONTACT	BY SECURITY CONTRACTOR – 679-05	BLK	SCE
1	EA	POWER SUPPLY	BY SECURITY CONTRACTOR – PS 902	LGR	VON
1	SET	WIRING DIAGRAMS	AS REQ'D		

**OPERATIONAL DESCRIPTION**

1. Free egress at all times.
2. Authorized credential momentarily releases outside lever, allowing entry.
3. Key in outside trim retracts latch for entry only. Door re-secures when key is removed.
4. RX switch (Integral to locking hardware) monitors authorized egress.
5. Door Contact monitors when door opens and closes.
6. On loss of power, electrified hardware is disabled. Door remains in current latched state. Trim remains secure.
7. Opening requires integration with access control system.

**HARDWARE GROUP NO. 02** (exterior double)

For use on mark/ door #(s):

136

EACH TO HAVE:

<b>Qty</b>		<b>Description</b>	<b>Catalog Number</b>	<b>Finish</b>	<b>Mfr</b>
1	SET	HINGE	5BB1 (QTY, WEIGHT, SIZE, NRP AS REQ'D)	652	IVE
1	EA	SIMPLEX READER	CO-100-MS-70-KP	626	SCH
1	EA	PERMANENT CORE	1C-7	626	BES
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP1/ DP2 AS REQ'D	626	IVE
2	EA	SURFACE CLOSER (W/ SPRING STOP)	4040XP SCUSH	689	LCN
2	EA	KICK PLATE	8400 10" B-CS	630	IVE
1	EA	GASKETING	429 AT HEAD AND JAMBS	AA	ZER
1	EA	RAIN DRIP	142AA	AL	ZER
1	EA	DOOR SWEEP	39A	AL	ZER
1	EA	OVERLAPPING ASTRAGAL	44STST	STST	ZER
1	EA	THRESHOLD	655A/ AS REQ'D BY SILL DETAIL	AL	ZER

**HARDWARE GROUP NO. 02A** (exterior double at training tower)

For use on mark/ door #(s):

203A

EACH TO HAVE:

<b>Qty</b>		<b>Description</b>	<b>Catalog Number</b>	<b>Finish</b>	<b>Mfr</b>
1	SET	HINGE (2 EA LEAF)	5BB1 (QTY, WEIGHT, SIZE, NRP AS REQ'D)	652	IVE
1	EA	EXIT LOCK	ND25D RHO	626	SCH
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
2	EA	DUST PROOF STRIKE	DP1/ DP2 AS REQ'D TOP AND BOTTOM	626	IVE
2	EA	SURFACE CLOSER (W/ SPRING HOLD)	4040XP SHUSH	689	LCN
1	EA	GASKETING	429 AT HEAD AND JAMBS	AA	ZER
1	EA	RAIN DRIP	142AA	AL	ZER
2	EA	DOOR SWEEP	39A	AL	ZER
1	EA	OVERLAPPING ASTRAGAL	41STST	STST	ZER
1	EA	THRESHOLD	566A	AL	ZER

**HARDWARE GROUP NO. 03** (interior office)

For use on mark/ door #(s):

101 103

EACH TO HAVE:

<b>Qty</b>		<b>Description</b>	<b>Catalog Number</b>	<b>Finish</b>	<b>Mfr</b>
1	SET	HINGE	5BB1 (QTY, WEIGHT, SIZE, NRP AS REQ'D)	652	IVE
1	EA	OFFICE/ ENTRY LOCK	ND50BD RHO	626	SCH
1	EA	PERMANENT CORE	1C-7	626	BES
1	EA	WALL STOP	WS406/ 407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

**HARDWARE GROUP NO. 04** (interior privacy)

For use on mark/ door #(s):

104 113 114 115

EACH TO HAVE:

<b>Qty</b>		<b>Description</b>	<b>Catalog Number</b>	<b>Finish</b>	<b>Mfr</b>
1	SET	HINGE	5BB1 (QTY, WEIGHT, SIZE, NRP AS REQ'D)	652	IVE
1	EA	PRIVACY LOCK	ND40S RHO	626	SCH
1	EA	KICK PLATE	8400 10" B-CS	630	IVE
1	EA	WALL STOP	WS406/ 407CCV	630	IVE
1	EA	GASKETING	188S AT HEAD AND JAMBS	BK	ZER

**HARDWARE GROUP NO. 05** (interior passage)

For use on mark/ door #(s):

112 119 136A

EACH TO HAVE:

<b>Qty</b>		<b>Description</b>	<b>Catalog Number</b>	<b>Finish</b>	<b>Mfr</b>
1	SET	HINGE	5BB1 (QTY, WEIGHT, SIZE, NRP AS REQ'D)	652	IVE
1	EA	PASSAGE SET	ND10S RHO	626	SCH
1	EA	KICK PLATE	8400 10" X 2" LDW B4E	630	IVE
1	EA	WALL STOP	WS406/ 407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

**HARDWARE GROUP NO. 06** (interior passage w/ closer)

For use on mark/ door #(s):

103A 110 121A 127

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
1	SET	HINGE	5BB1 (QTY, WEIGHT, SIZE, NRP AS REQ'D)	652	IVE
1	EA	PUSH/ PULL PADDLE SET	1PDN	32D	MARKS USA
1	EA	SURFACE CLOSER	4040XP EDA	689	LCN
1	EA	KICK PLATE	8400 10" B-CS	630	IVE
1	EA	WALL STOP	WS406/ 407CCV	630	IVE
1	SET	GASKETING	188S AT HEAD AND JAMBS	BK	ZER

**HARDWARE GROUP NO. 07** (interior passage w/ closer and spring stop)

For use on mark/ door #(s):

103B 110A 127A

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
1	SET	HINGE	5BB1 (QTY, WEIGHT, SIZE, NRP AS REQ'D)	652	IVE
1	EA	PUSH/ PULL PADDLE SET	1PDN	32D	MARKS USA
1	EA	SURFACE CLOSER (W/ SPRING STOP)	4040XP SCUSH	689	LCN
1	EA	KICK PLATE	8400 10" B-CS	630	IVE
1	SET	GASKETING	188S AT HEAD AND JAMBS	BK	ZER
1	EA	THRESHOLD	655A/ AS REQ'D BY SILL DETAIL	AL	ZER

**HARDWARE GROUP NO. 08** (interior classroom)

For use on mark/ door #(s):

109

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
1	SET	HINGE	5BB1 (QTY, WEIGHT, SIZE, NRP AS REQ'D)	652	IVE
1	EA	CLASSROOM LOCK	ND70BD RHO	626	SCH
1	EA	PERMANENT CORE	1C-7	626	BES
1	EA	WALL STOP	WS406/ 407CCV	630	IVE
3	EA	SILENCER	SR64	GRY	IVE

**HARDWARE GROUP NO. 09** (interior double at electrical)

For use on mark/ door #(s):

129

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
1	SET	HINGE	5BB1 (QTY, WEIGHT, SIZE, NRP AS REQ'D)	652	IVE
1	EA	CLASSROOM LOCK	ND70BD RHO	626	SCH
1	EA	PERMANENT CORE	1C-7	626	BES
2	EA	MANUAL FLUSH BOLT	FB458	626	IVE
1	EA	DUST PROOF STRIKE	DP1/ DP2 AS REQ'D	626	IVE
2	EA	OH STOP	450S	630	GLY
1	SET	GASKETING	188S AT HEAD AND JAMBS	BK	ZER
1	EA	THRESHOLD	655A/ AS REQ'D BY SILL DETAIL	AL	ZER

**HARDWARE GROUP NO. 10** (interior storeroom w/ overhead stop)

For use on mark/ door #(s):

111

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
1	SET	HINGE	5BB1 (QTY, WEIGHT, SIZE, NRP AS REQ'D)	652	IVE
1	EA	STOREROOM LOCK	ND80BD RHO	626	SCH
1	EA	PERMANENT CORE	1C-7	626	BES
1	EA	OH STOP	90S	630	GLY
1	EA	ELEC STRIKE	5100	689	VON
1	EA	MULTITECH READER	BY SECURITY CONTRACTOR – MTK15	BLK	SCE
1	EA	DOOR CONTACT	BY SECURITY CONTRACTOR – 679-05	BLK	SCE
1	EA	POWER SUPPLY	BY SECURITY CONTRACTOR – PS902 900-2RS	LGR	VON
1	SET	WIRING DIAGRAMS	AS REQ'D		
1	SET	GASKETING	188S AT HEAD AND JAMBS	BK	ZER

**HARDWARE GROUP NO. 11** (interior storeroom at mechanical)

For use on mark/ door #(s):

128

EACH TO HAVE:

Qty		Description	Catalog Number	Finish	Mfr
1	SET	HINGE	5BB1 (QTY, WEIGHT, SIZE, NRP AS REQ'D)	652	IVE
1	EA	STOREROOM LOCK	ND80BD RHO	626	SCH
1	EA	PERMANENT CORE	1C-7	626	BES
1	EA	KICK PLATE	8400 10" B-CS	630	IVE
1	SET	GASKETING	188S AT HEAD AND JAMBS	BK	ZER

**HARDWARE GROUP NO. 11A** (interior storeroom at attic)

For use on mark/ door #(s):

200

EACH TO HAVE:

Qty	Description	Catalog Number	Finish	Mfr
1	SET HINGE	5BB1 (QTY, WEIGHT, SIZE, NRP AS REQ'D)	652	IVE
1	EA STOREROOM LOCK	ND80BD RHO	626	SCH
1	EA PERMANENT CORE	1C-7	626	BES
1	SET GASKETING	188S AT HEAD AND JAMBS	BK	ZER

**HARDWARE GROUP NO. 12** (interior privacy)

For use on mark/ door #(s):

116 117 118 122 123 124 125 126

EACH TO HAVE:

Qty	Description	Catalog Number	Finish	Mfr
1	SET HINGE	5BB1 (QTY, WEIGHT, SIZE, NRP AS REQ'D)	652	IVE
1	EA PRIVACY LOCK	ND40S RHO	626	SCH
1	EA KICK PLATE	8400 10" B-CS	630	IVE
1	EA WALL STOP	WS406/ 407CCV	630	IVE
1	SET GASKETING	188S AT HEAD AND JAMBS	BK	ZER

**HARDWARE GROUP NO. 13** (traffic doors)

For use on mark/ door #(s):

134

EACH TO HAVE:

Qty	Description	Catalog Number	Finish	Mfr
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- A) Balance of hardware by traffic door manufacturer.

**HARDWARE GROUP NO. 14** (overhead sectional doors)

For use on mark/ door #(s):

130 130A 131 131A 132 132A

EACH TO HAVE:

Qty	Description	Catalog Number	Finish	Mfr
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- A) Balance of hardware by traffic door manufacturer.
- B) No locking mechanism on doors, doors to be secured by electric operator.

**END OF SECTION 08 06 72**



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**SECTION 08 11 13  
HOLLOW METAL DOORS AND FRAMES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Non-fire-rated hollow metal doors and frames.
- B. Hollow metal frames for wood doors.
- C. Thermally insulated hollow metal doors with frames.
- D. Hollow metal borrowed lites glazing frames.

**1.02 RELATED REQUIREMENTS**

- A. Section 08 71 00 - Door Hardware.
- B. Section 08 80 00 - Glazing: Glass for doors and borrowed lites.
- C. Section 09 91 13 - Exterior Painting: Field painting.
- D. Section 09 91 23 - Interior Painting: Field painting.

**1.03 REFERENCE STANDARDS**

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. ANSI/SDI A250.4 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors, Frames and Frame Anchors 2011.
- C. ANSI/SDI A250.8 - Specifications for Standard Steel Doors and Frames (SDI-100) 2017.
- D. ANSI/SDI A250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames 2011.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- F. ASTM A1008/A1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable 2020.
- G. ASTM A1011/A1011M - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength 2018a.
- H. ASTM C143/C143M - Standard Test Method for Slump of Hydraulic-Cement Concrete 2020.
- I. ASTM C476 - Standard Specification for Grout for Masonry 2020.
- J. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames 2016.
- K. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- L. NAAMM HMMA 830 - Hardware Selection for Hollow Metal Doors and Frames 2002.
- M. NAAMM HMMA 831 - Hardware Locations for Hollow Metal Doors and Frames 2011.
- N. NAAMM HMMA 840 - Guide Specifications For Receipt, Storage and Installation of Hollow Metal Doors and Frames 2007.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Materials and details of design and construction, hardware locations, reinforcement type and locations, anchorage and fastening methods, and finishes; and one copy of referenced standards/guidelines.

- C. Shop Drawings: Details of each opening, showing elevations, glazing, frame profiles, and any indicated finish requirements.

### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years of experience.

### **1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with NAAMM HMMA 840 or ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
- B. Protect with resilient packaging; avoid humidity build-up under coverings; prevent corrosion and adverse effects on factory applied painted finish.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Hollow Metal Doors and Frames:
  - 1. Ceco Door, an Assa Abloy Group company: [www.assaabloydss.com/#sle](http://www.assaabloydss.com/#sle).
  - 2. Curries, an Assa Abloy Group company: [www.assaabloydss.com/#sle](http://www.assaabloydss.com/#sle).
  - 3. Republic Doors, an Allegion brand: [www.republicdoor.com/#sle](http://www.republicdoor.com/#sle).
  - 4. Steelcraft, an Allegion brand: [www.allegion.com/#sle](http://www.allegion.com/#sle).
  - 5. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.02 PERFORMANCE REQUIREMENTS**

- A. Requirements for Hollow Metal Doors and Frames:
  - 1. Steel Sheet: Comply with one or more of the following requirements; galvanized steel complying with ASTM A653/A653M, cold-rolled steel complying with ASTM A1008/A1008M, or hot-rolled pickled and oiled (HRPO) steel complying with ASTM A1011/A1011M, commercial steel (CS) Type B, for each.
  - 2. Accessibility: Comply with ICC A117.1 and ADA Standards.
  - 3. Exterior Door Top Closures: Flush end closure channel, with top and door faces aligned.
  - 4. Door Edge Profile: Manufacturers standard for application indicated.
  - 5. Typical Door Face Sheets: Flush.
  - 6. Glazed Lights: Non-removable stops on non-secure side; sizes and configurations as indicated on drawings. Style: Manufacturers standard.
  - 7. Hardware Preparations, Selections and Locations: Comply with NAAMM HMMA 830 and NAAMM HMMA 831 or BHMA A156.115 and ANSI/SDI A250.8 (SDI-100) in accordance with specified requirements.
  - 8. Zinc Coating for Typical Interior and/or Exterior Locations: Provide metal components zinc-coated (galvanized) and/or zinc-iron alloy-coated (galvanized) by the hot-dip process in accordance with ASTM A653/A653M, with manufacturer's standard coating thickness, unless noted otherwise for specific hollow metal doors and frames.
    - a. Based on SDI Standards: Provide at least A40/ZF120 (galvanized) when necessary, coating not required for typical interior door applications, and at least A60/ZF180 (galvanized) for corrosive locations.
- B. Hollow Metal Panels: Same construction, performance, and finish as doors.
- C. Combined Requirements: If a particular door and frame unit is indicated to comply with more than one type of requirement, comply with the specified requirements for each type; for instance, an exterior door that is also indicated as being sound-rated must comply with the requirements specified for exterior doors and for sound-rated doors; where two requirements conflict, comply with the most stringent.

### **2.03 HOLLOW METAL DOORS**

- A. Door Finish: Factory primed and field finished.
- B. Exterior Doors: Thermally insulated.
  - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 2 - Heavy-duty.
    - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.
    - d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
    - e. Zinc Coating: A60/ZF180 galvanized coating; ASTM A653/A653M.
  - 2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
  - 3. Door Thickness: 1-3/4 inches, nominal.
- C. Interior Doors, Non-Fire-Rated:
  - 1. Based on SDI Standards: ANSI/SDI A250.8 (SDI-100).
    - a. Level 2 - Heavy-duty.
    - b. Physical Performance Level B, 500,000 cycles; in accordance with ANSI/SDI A250.4.
    - c. Model 1 - Full Flush.
    - d. Door Face Metal Thickness: 18 gauge, 0.042 inch, minimum.
  - 2. Door Core Material: Manufacturers standard core material/construction and in compliance with requirements.
  - 3. Door Thickness: 1-3/4 inches, nominal.

### **2.04 HOLLOW METAL FRAMES**

- A. Comply with standards and/or custom guidelines as indicated for corresponding door in accordance with applicable door frame requirements.
- B. Frame Finish: Factory primed and field finished.
- C. Exterior Door Frames: Full profile/continuously welded type.
  - 1. Galvanizing: Components hot-dipped zinc-iron alloy-coated (galvanized) in accordance with ASTM A653/A653M, with A40/ZF120 coating.
  - 2. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.
  - 3. Weatherstripping: Separate, see Section 08 71 00.
- D. Interior Door Frames, Non-Fire Rated: Full profile/continuously welded type.
  - 1. Frame Metal Thickness: 18 gauge, 0.042 inch, minimum.
- E. Frames for Wood Doors: Comply with frame requirements in accordance with corresponding door.
- F. Borrowed Lites Glazing Frames: Construction and face dimensions to match door frames, and as indicated on drawings.
- G. Provide mortar guard boxes for hardware cut-outs in frames to be installed in masonry or to be grouted.
- H. Frames in Masonry Walls: Size to suit masonry coursing with head member 4 inches high to fill opening without cutting masonry units.
- I. Frames Wider than 48 inches: Reinforce with steel channel fitted tightly into frame head, flush with top.

### **2.05 FINISHES**

- A. Primer: Rust-inhibiting, complying with ANSI/SDI A250.10, door manufacturer's standard.

### **2.06 ACCESSORIES**

- A. Door Window Frames: Door window frames with glazing securely fastened within door opening.

1. Size: As indicated on drawings.
  2. Frame Material: 18 gauge, 0.0478 inch, primed steel.
- B. Glazing: As specified in Section 08 80 00.
  - C. Removable Stops: Formed sheet steel, shape as indicated on drawings, mitered or butted corners; prepared for countersink style tamper proof screws.
  - D. Astragals for Double Doors: Specified in Section 08 7100.
  - E. Grout for Frames: Mortar grout complying with ASTM C476 with maximum slump of 4 inches as measured in accordance with ASTM C143/C143M for hand troweling in place; plaster grout and thinner pumpable grout are prohibited.
  - F. Silencers: Resilient rubber, fitted into drilled hole; provide three on strike side of single door, three on center mullion of pairs, and two on head of pairs without center mullions.
  - G. Temporary Frame Spreaders: Provide for factory- or shop-assembled frames.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Verify that finished walls are in plane to ensure proper door alignment.

#### **3.02 PREPARATION**

- A. Coat inside of frames to be installed in masonry or to be grouted, with bituminous coating, prior to installation.

#### **3.03 INSTALLATION**

- A. Install doors and frames in accordance with manufacturer's instructions and related requirements of specified door and frame standards or custom guidelines indicated.
- B. Coordinate frame anchor placement with wall construction.
- C. Grout frames in masonry construction, using hand trowel methods; brace frames so that pressure of grout before setting will not deform frames.
- D. Install door hardware as specified in Section 08 71 00.

#### **3.04 TOLERANCES**

- A. Maximum Diagonal Distortion: 1/16 inch measured with straight edge, corner to corner.

#### **3.05 ADJUSTING**

- A. Adjust for smooth and balanced door movement.

#### **3.06 SCHEDULE**

- A. Refer to Door and Frame Schedule on the drawings.

**END OF SECTION**

**SECTION 08 14 16  
FLUSH WOOD DOORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Flush wood doors; flush configuration; non-rated.

**1.02 RELATED REQUIREMENTS**

- A. Section 08 11 13 - Hollow Metal Doors and Frames.
- B. Section 08 71 00 - Door Hardware.
- C. Section 08 80 00 - Glazing.

**1.03 REFERENCE STANDARDS**

- A. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards 2014, with Errata (2018).
- B. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1 2017, with Errata (2019).

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.
- C. Shop Drawings: Show doors and frames, elevations, sizes, types, swings, undercuts, beveling, blocking for hardware, factory machining, factory finishing, cutouts for glazing and other details.
- D. Samples: Submit two samples of door veneer, 3 by 5 inches (or similar) in size illustrating wood grain, stain color, and sheen.
- E. Warranty, executed in Owner's name.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section, with not less than three years of experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Package, deliver and store doors in accordance with specified quality standard.
- B. Accept doors on site in manufacturer's packaging, and inspect for damage.
- C. Protect doors with resilient packaging sealed with heat shrunk plastic; do not store in damp or wet areas or areas where sunlight might bleach veneer; seal top and bottom edges with tinted sealer if stored more than one week, and break seal on site to permit ventilation.

**1.07 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Interior Doors: Provide manufacturer's warranty for the life of the installation.
- C. Include coverage for delamination of veneer, warping beyond specified installation tolerances, defective materials, and telegraphing core construction.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Wood Veneer Faced Doors:
  - 1. Masonite Architectural; Aspiro Select Wood Veneer Doors:  
[www.architectural.masonite.com/#sle](http://www.architectural.masonite.com/#sle).

2. Oregon Door; Architectural Series: [www.oregondoor.com/#sle](http://www.oregondoor.com/#sle).
3. VT Industries, Inc: [www.vtindustries.com/#sle](http://www.vtindustries.com/#sle).
4. Substitutions: See Section 01 60 00 - Product Requirements.

## **2.02 DOORS AND PANELS**

- A. Doors: See drawings for locations and additional requirements.
  1. Quality Standard: Custom Grade, Heavy Duty performance, in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), unless noted otherwise.
  2. Wood Veneer Faced Doors: 5-ply unless otherwise indicated.
- B. Interior Doors: 1-3/4 inches thick unless otherwise indicated; flush construction.
  1. Provide solid core doors at each location.
  2. Wood veneer facing with factory transparent finish as selected.

## **2.03 DOOR AND PANEL CORES**

- A. Non-Rated Solid Core and 20 Minute Rated Doors: Type structural composite lumber core (SCLC), plies and faces as indicated.

## **2.04 DOOR FACINGS**

- A. Veneer Facing for Transparent Finish: Walnut, plain sliced, veneer grade in accordance with quality standard indicated, plain sliced (flat cut), with book match between leaves of veneer, running match of spliced veneer leaves assembled on door or panel face.

## **2.05 DOOR CONSTRUCTION**

- A. Fabricate doors in accordance with door quality standard specified.
- B. Cores Constructed with stiles and rails:
- C. Glazed Openings: Non-removable stops on non-secure side; manufacturer's standard sizes and configurations.
- D. Factory machine doors for hardware other than surface-mounted hardware, in accordance with hardware requirements and dimensions.
- E. Factory fit doors for frame opening dimensions identified on shop drawings, with edge clearances in accordance with specified quality standard.
- F. Provide edge clearances in accordance with the quality standard specified.

## **2.06 FINISHES - WOOD VENEER DOORS**

- A. Finish work in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 5 - Finishing for grade specified and as follows:
  1. Transparent:
    - a. System - 11, Polyurethane, Catalyzed.
    - b. Sheen: Satin.
- B. Factory finish doors in accordance with approved sample.

## **2.07 ACCESSORIES**

- A. Hollow Metal Door Frames: See Section 08 11 13.
- B. Door Window Frames: Door window frames with glazing securely fastened within door opening.
  1. Size: As indicated on drawings.
  2. Frame Material: 18 gauge, 0.0478 inch, galvanized steel.
- C. Glazing: See Section 08 80 00.
- D. Glazing Stops: Wood, of same species as door facing, butted corners; prepared for countersink style screws.
- E. Door Hardware: See Section 08 71 00.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that opening sizes and tolerances are acceptable.
- C. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

### **3.02 INSTALLATION**

- A. Install doors in accordance with manufacturer's instructions and specified quality standard.
- B. Factory-Finished Doors: Do not field cut or trim; if fit or clearance is not correct, replace door.
- C. Use machine tools to cut or drill for hardware.
- D. Coordinate installation of doors with installation of frames and hardware.
- E. Coordinate installation of glazing.

### **3.03 ADJUSTING**

- A. Adjust doors for smooth and balanced door movement.
- B. Adjust closers for full closure.

### **3.04 SCHEDULE**

- A. See Door and Frame Schedule on drawings.

**END OF SECTION**



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**SECTION 08 31 00  
ACCESS DOORS AND PANELS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Wall and ceiling mounted access units.
- B. Floor mounted access door and frame units, interior.

**1.02 REFERENCE STANDARDS**

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide sizes, types, finishes, hardware, scheduled locations, and details of adjoining work.
- C. Shop Drawings: Indicate exact position of each access door and/or panel unit.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years experience.

**PART 2 PRODUCTS**

**2.01 WALL AND CEILING MOUNTED ACCESS UNITS**

- A. Manufacturers:
  - 1. Activar Construction Products Group, Inc. - JL Industries: [www.activarcpg.com/#sle](http://www.activarcpg.com/#sle).
  - 2. Babcock-Davis: [www.babcockdavis.com/#sle](http://www.babcockdavis.com/#sle).
  - 3. Nystrom, Inc: [www.nystrom.com/#sle](http://www.nystrom.com/#sle).
- B. Wall and Ceiling Mounted Units: Factory fabricated door and frame, fully assembled units with corner joints welded, filled and ground flush; square and without rack or warp; coordinate requirements with type of installation assembly being used for each unit.
  - 1. Material: Steel.
  - 2. Style: Recessed door panel for infill with wall/ceiling finish.
    - a. Gypsum Board Mounting Criteria: Use drywall bead type frame.
  - 3. Door Style: Single thickness with rolled or turned in edges.
  - 4. Heavy Duty Single Steel Sheet Door Panels: 14 gauge, 0.0747 inch, minimum thickness.
  - 5. Door Panels to Receive Wall/Ceiling Finish: Surface recessed 5/8 inch back from wall face.
  - 6. Steel Finish: Primed.
  - 7. Door/Panel Size: As needed to access equipment behind.
  - 8. Hardware:
    - a. Hinges for Non-Fire-Rated Units: Concealed, constant force closure spring type.
    - b. Latch/Lock: Screw driver slot for quarter turn cam latch.

**2.02 FLOOR MOUNTED ACCESS UNITS**

- A. Manufacturers:
  - 1. ACUDOR Products Inc: [www.acudor.com/#sle](http://www.acudor.com/#sle).
  - 2. Babcock-Davis: [www.babcockdavis.com/#sle](http://www.babcockdavis.com/#sle).
  - 3. BILCO Company: [www.bilco.com/#sle](http://www.bilco.com/#sle).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Floor Mounted Access Units: Factory fabricated, fully assembled units with corner joints welded, filled, and ground flush; square and without rack or warp; coordinate requirements with

type of installation assembly being used for each unit.

1. Size: As indicated on drawings.
2. Hardware: Manufacturer's standard, suitable for intended application.
  - a. Hinges: Non-removable pin.
  - b. Lock: Screw driver slot for quarter turn cam lock.
- C. Interior Floor Mounted Access Units: Aluminum, minimum 1/4 inch thick.
  1. Design Load: Design to support live load of 150 psf with deflection not to exceed 1/180 of span.
  2. Operation: Manual opening, and dampened self-closing.
  3. Cover: 1/8 inch deep recess with edge molding.
  4. Lift Handle: Recessed, non-removable.
  5. Finish: Mill finish.
  6. Manufacturers:
    - a. ACUDOR Products Inc; FT-8040: [www.acudor.com/#sle](http://www.acudor.com/#sle).
    - b. BILCO Company; Type T - Carpet or Composite Flooring: [www.bilco.com/#sle](http://www.bilco.com/#sle).
    - c. Substitutions: See Section 01 60 00 - Product Requirements.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that rough openings are correctly sized and located.

#### **3.02 INSTALLATION**

- A. Install units in accordance with manufacturer's instructions.
- B. Install frames plumb and level in openings, and secure units rigidly in place.
- C. Position units to provide convenient access to concealed equipment when necessary.

**END OF SECTION**

**SECTION 08 36 13  
SECTIONAL DOORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Overhead sectional doors, electrically operated.
- B. Operating hardware and supports.
- C. Electrical controls.

**1.02 REFERENCE STANDARDS**

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- B. ASTM C1036 - Standard Specification for Flat Glass 2016.
- C. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- D. ASTM E283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2004 (Reapproved 2012).
- E. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference 2014.
- F. DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors 2011.
- G. NEMA ICS 2 - Industrial Control and Systems Controllers, Contactors and Overload Relays Rated 600 Volts 2000, with Errata (2008).
- H. NEMA MG 1 - Motors and Generators 2018.
- I. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum) 2018.
- J. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- K. UL 325 - Standard for Door, Drapery, Gate, Louver, and Window Operators and Systems Current Edition, Including All Revisions.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Shop Drawings: Indicate opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.
- C. Product Data: Show component construction, anchorage method, and hardware.
- D. Samples: Submit panel finish samples, illustrating color and finish.
- E. Operation Data: Include normal operation, troubleshooting, and adjusting.
- F. Maintenance Data: Include data for motor and transmission, shaft and gearing, lubrication frequency, spare part sources.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years experience.

## 1.05 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals for warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Warranty: Include coverage for electric motor and transmission.
- D. Provide five year manufacturer warranty for electric operating equipment.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Basis of Design: 3216 manufactured by C.H.I. Overhead Doors.
- B. Other Acceptable Manufacturers - Sectional Doors:
  - 1. Raynor Garage Doors; TC Series, Model TC200: [www.raynor.com/#sle](http://www.raynor.com/#sle).
  - 2. Wayne-Dalton, a Division of Overhead Door Corporation; Thermospan 150: [www.wayne-dalton.com/#sle](http://www.wayne-dalton.com/#sle).

### 2.02 STEEL DOORS

- A. Steel Doors: Flush steel, insulated; standard lift operating style with track and hardware; complying with DASMA 102, Commercial application.
  - 1. Performance: Withstand positive and negative wind loads equal to 1.5 times design wind loads specified by local code without damage or permanent set, when tested in accordance with ASTM E330/E330M, using 10 second duration of maximum load.
  - 2. Door Nominal Thickness: 2 inches thick.
  - 3. Thermal Transmittance: U-factor of 0.31 Btu/hr sq ft degrees F, maximum, in accordance with DASMA 102.
  - 4. Air Leakage Rate: Less than 0.40 cfm/sf when tested in accordance with ASTM E283 at test pressure difference of 1.57 psf.
  - 5. Exterior Finish: Factory finished with polyester baked enamel; color as selected by Architect.
  - 6. Interior Finish: Factory finished with polyester baked enamel; color as selected from manufacturers standard line.
  - 7. Glazed Lights: Full panel width, one row; set in place with resilient glazing channel.
  - 8. Electric Operation: Electric control station.
- B. Door Panels: Steel construction; outer steel sheet of 27 gauge, 0.0164 inch minimum thickness, flush profile; inner steel sheet of 27 gauge, 0.0164 inch minimum thickness, flat profile; core reinforcement [ ] inch sheet steel roll formed to channel shape, rabbeted weather joints at meeting rails; polyurethane insulation.
- C. Window Frame: Manufacturers standard, finish to match.
- D. Glazing: Annealed float glass; single pane; clear; 1/4 inch overall thickness.

### 2.03 COMPONENTS

- A. Track: Rolled galvanized steel, 0.090 inch minimum thickness; 2 inch wide, continuous one piece per side; galvanized steel mounting brackets 1/4 inch thick.
- B. Hinge and Roller Assemblies: Heavy duty hinges and adjustable roller holders of galvanized steel; floating hardened steel bearing rollers, located at top and bottom of each panel, each side.
- C. Lift Mechanism: Torsion spring on cross head shaft, with braided galvanized steel lifting cables.
- D. Sill Weatherstripping: Resilient hollow rubber strip, one piece; fitted to bottom of door panel, full length contact.
- E. Jamb Weatherstripping: Roll formed steel section full height of jamb, fitted with resilient weatherstripping, placed in moderate contact with door panels.

- F. Head Weatherstripping: EPDM rubber seal, one piece full length.
- G. Panel Joint Weatherstripping: Neoprene foam seal, one piece full length.
- H. Lock: Inside center mounted, adjustable keeper, spring activated latch bar with feature to retain in locked or retracted position; interior handle.

## **2.04 MATERIALS**

- A. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G60/Z180 coating, plain surface.
- B. Float Glass: Provide float glass glazing, unless noted otherwise.
  - 1. Annealed Type: ASTM C1036, Type I, transparent flat, Class 1 clear, Quality Q3 (glazing select).
  - 2. Heat-Strengthened and Fully Tempered Types: ASTM C1048.
- C. Insulation: Foamed-in-place polyurethane, bonded to facing.

## **2.05 ELECTRIC OPERATION**

- A. Electric Operators:
  - 1. Mounting: Center mounted draw bar assembly.
  - 2. Motor Enclosure:
    - a. Exterior Doors: NEMA MG 1, Type 4; open drip proof.
  - 3. Motor Rating: as required to operate door hp; continuous duty.
  - 4. Motor Voltage: 208 volts, three phase, 60 Hz.
  - 5. Motor Controller: NEMA ICS 2, full voltage, reversing magnetic motor starter.
  - 6. Controller Enclosure: NEMA 250, Type 1.
  - 7. Opening Speed: 12 inches per second.
  - 8. Brake: Adjustable friction clutch type, activated by motor controller.
  - 9. Manual override in case of power failure.
  - 10. Refer to Section 26 05 83 for electrical connections.
- B. Wiring Terminations: Provide terminal lugs to match branch circuit conductor quantities, sizes, and materials indicated; enclose terminal lugs in terminal box sized to comply with NFPA 70.
- C. Control Station: Provide standard three button (Open-Close-Stop) momentary-contact control device for each operator complying with UL 325.
  - 1. 24 volt circuit.
  - 2. Surface mounted, at interior door jamb.
  - 3. Entrapment Protection Devices: Provide sensing devices and safety mechanisms complying with UL 325.
    - a. Primary Device: Provide electric sensing edge as required with momentary-contact control device.
- D. Safety Edge: Located at bottom of sectional door panel, full width; electro-mechanical sensitized type, wired to stop and reverse door direction upon striking object; hollow neoprene covered to provide weatherstrip seal.
- E. Provide radio control antenna detector.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.
- B. Verify that electric power is available and of the correct characteristics.

### **3.02 INSTALLATION**

- A. Install door unit assembly in accordance with manufacturer's instructions.

- B. Anchor assembly to wall construction and building framing without distortion or stress.
- C. Securely brace door tracks suspended from structure. Secure tracks to structural members only.
- D. Fit and align door assembly including hardware.
- E. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

**3.03 TOLERANCES**

- A. Maximum Variation from Plumb: 1/16 inch.
- B. Maximum Variation from Level: 1/16 inch.
- C. Longitudinal or Diagonal Warp: Plus or minus 1/8 inch from 10 ft straight edge.
- D. Maintain dimensional tolerances and alignment with adjacent work.

**3.04 ADJUSTING**

- A. Adjust door assembly for smooth operation and full contact with weatherstripping.

**3.05 CLEANING**

- A. Clean doors and frames and glazing.
- B. Remove temporary labels and visible markings.

**3.06 PROTECTION**

- A. Protect installed products from damage until Date of Substantial Completion.
- B. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

**END OF SECTION**

**SECTION 08 38 00  
TRAFFIC DOORS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Double-acting self-closing swinging traffic doors.

**1.02 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's technical information for each type of door specified, including details about materials, components, profiles, gaskets, and finishes; include:
  - 1. Preparation and installation instructions and methods.
  - 2. Storage and handling requirements and recommendations.
  - 3. Operation and maintenance data.
- C. Shop Drawings: Show installation details of doors and frames, including elevations and attachment.

**1.03 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products of the type specified in this section, with not less than three years of experience.

**1.04 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver product in manufacturer's original unopened packages with label legible and intact.
- B. Store doors at project site on edge or in upright position, under cover and elevated above grade, following manufacturer's instructions.

**PART 2 PRODUCTS**

**2.01 RIGID AND SEMI-RIGID TRAFFIC DOORS**

- A. Wood Core Double-Acting Traffic Doors Wood core laminated with finish faces both sides, edges sealed or trimmed.
  - 1. Core: Solid oriented strand board; 3/4 inches thick.
  - 2. Finish: Same finish both sides.
  - 3. Faces: Stainless steel, Type 304, with No. 4 brushed satin finish; 18 gauge, 0.0500 inch minimum base metal thickness.
  - 4. Edge Trim: Type 304 stainless steel wrap-around channel trim applied over finish faces.
  - 5. Gaskets: Replaceable rubber gaskets held in keyed slot on edge of door.
  - 6. Bumpers: Provide spring bumpers on both sides of doors.
  - 7. Impact Plates: Provide stainless steel base plates on both sides of doors.
  - 8. Push Plates: Provide stainless steel push plates on both sides of doors.
  - 9. Manufacturers:
    - a. Eliason Corporation; Model SCG-3: [www.eliasoncorp.com/#sle](http://www.eliasoncorp.com/#sle).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Door Assemblies: Provide double-acting, self-closing pairs of doors for installation in frame provided by others; factory fabricated and finished, complete with hinges and specified accessories.
  - 1. Door Swing: Minimum of 90 degrees each direction.
  - 2. Hinges: V-cam gravity hinges at top and pivots at bottom; mounted on bottom of header and on top of floor; maximum rise 1-1/2 inches; vertical and horizontal adjustment in the field ; manufacturer's standard lower hinge guards.
  - 3. Hinge Guards: Manufacturer's standard material and configuration, to protect lower hinges from damage.
  - 4. Exposed Metal Parts: Either stainless steel, extruded aluminum, or powder coated.



5. View Windows: Provide view window in each door panel unless otherwise indicated, centered in door width, and 48 inches, maximum, from finish floor to bottom of viewing area.
6. Dimensional Tolerances: Plus or minus 1/4 inch in width and height of each panel.
- C. View Windows: Factory installed glazing in molded or extruded black thermoplastic or rubber gasket; centered in door width; use single glazing unless otherwise indicated.
  1. Single Glazing: Acrylic glazing sheet, 1/4 inch thick, clear.
- D. Door Gaskets: Manufacturer's standard configuration.
  1. Thermal Gaskets: 55 to 70 durometer extruded black santoprene.
  2. Other Gaskets: Santoprene or PVC.
- E. Impact Plates: Surface applied; factory installed.
  1. Base Plates: 12 inches high by full width of door panel, mounted at bottom of door.
  2. Push Plates: 12 inches high by 12 inches wide, mounted at leading edge of door with centerline at 48 inches above floor.
  3. Stainless Steel: Type 304, with No.4 brushed satin finish; 18 gauge, 0.0500 inch minimum base metal thickness.
- F. Spring Bumpers: Teardrop style, polyethylene; projecting 3 inches from door panel.
  1. Height: 6 inches.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify that jambs and frames are square and plumb.
- B. Verify that opening is ready to receive work and opening dimensions and clearances are as indicated on drawings.
- C. If substrate preparation is responsibility of another installer, notify Architect of unsatisfactory conditions before proceeding.
- D. Commencement of work by installer is acceptance of opening conditions.

#### **3.02 INSTALLATION**

- A. Install doors with clearances, anchors, hardware, and accessories according to the manufacturer's instructions and as specified.
- B. Install doors plumb, level, and properly aligned.

#### **3.03 ADJUSTING**

- A. Clean and lubricate operating parts.
- B. Adjust doors to open and close smoothly and freely without binding and for proper fit of seals.

**END OF SECTION**

**SECTION 08 43 13**  
**ALUMINUM-FRAMED STOREFRONTS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Aluminum-framed storefront, with vision glass.
- B. Aluminum doors and frames.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 25 00 - Weather Barriers: Sealing framing to weather barrier installed on adjacent construction.
- B. Section 08 51 13 - Aluminum Windows: Operable sash within glazing system.
- C. Section 08 71 00 - Door Hardware: Hardware items other than specified in this section.
- D. Section 08 80 00 - Glazing: Glass and glazing accessories.

**1.03 REFERENCE STANDARDS**

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site 2015.
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2014 (2015 Errata).
- C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2020.
- E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2013.
- F. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2019.
- G. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference 2014.
- H. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference 2000 (Reapproved 2016).

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, glass and infill, door hardware, and internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related work, expansion and contraction joint location and details, and field welding required.
- D. Samples: Submit samples illustrating finished aluminum surface, glass, glazing materials.
- E. Design Data: Provide framing member structural and physical characteristics, engineering calculations, and dimensional limitations.
- F. Hardware Schedule: Complete itemization of each item of hardware to be provided for each door, cross-referenced to door identification numbers in Contract Documents.
- G. Warranty: Submit manufacturer warranty and ensure forms have been completed in Owner's name and registered with manufacturer.

## 1.05 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in performing work of type specified and with at least three years of experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of experience.

## 1.06 DELIVERY, STORAGE, AND HANDLING

- A. Handle products of this section in accordance with AAMA CW-10.
- B. Protect finished aluminum surfaces with wrapping. Do not use adhesive papers or sprayed coatings that bond to aluminum when exposed to sunlight or weather.

## 1.07 WARRANTY

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion.
- C. Provide five year manufacturer warranty against excessive degradation of exterior finish. Include provision for replacement of units with excessive fading, chalking, or flaking.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Basis of Design: Kawneer North America 451T Thermal Framing System.
- B. Other Acceptable - Aluminum-Framed Storefronts Manufacturers:
  - 1. Arcadia, Inc: [www.arcadiainc.com/#sle](http://www.arcadiainc.com/#sle).
  - 2. Manko Window Systems, Inc: [www.mankowindows.com/#sle](http://www.mankowindows.com/#sle).
  - 3. Tubelite, Inc: [www.tubeliteinc.com/#sle](http://www.tubeliteinc.com/#sle).
  - 4. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 ALUMINUM-FRAMED STOREFRONT

- A. Aluminum-Framed Storefront: Factory fabricated, factory finished aluminum framing members with infill, and related flashings, anchorage and attachment devices.
  - 1. Glazing Rabbet: For 1 inch insulating glazing.
  - 2. Glazing Position: Centered (front to back).
  - 3. Vertical Mullion Dimensions: 2 inches wide by 4-1/2 inches deep.
  - 4. Finish: Class I color anodized.
    - a. Factory finish all surfaces that will be exposed in completed assemblies.
    - b. Coat concealed metal surfaces that will be in contact with cementitious materials or dissimilar metals with bituminous paint.
  - 5. Finish Color: As selected by Architect from manufacturer's standard line.
  - 6. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors and hardware; fasteners and attachments concealed from view; reinforced as required for imposed loads.
  - 7. Construction: Eliminate noises caused by wind and thermal movement, prevent vibration harmonics, and prevent "stack effect" in internal spaces.
  - 8. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
  - 9. Expansion/Contraction: Provide for expansion and contraction within system components caused by cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components, anchorages, and other building elements.
  - 10. Movement: Allow for movement between storefront and adjacent construction, without damage to components or deterioration of seals.

11. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
  12. Air and Vapor Seal: Maintain continuous air barrier and vapor retarder throughout assembly, primarily in line with inside pane of glazing and heel bead of glazing compound.
- B. Performance Requirements
1. Wind Loads: Design and size components to withstand the specified load requirements without damage or permanent set, when tested in accordance with ASTM E330/E330M, using loads 1.5 times the design wind loads and 10 second duration of maximum load.
    - a. Design Wind Loads: Comply with requirements of ASCE 7.
    - b. Member Deflection: Limit member deflection to flexure limit of glass in any direction, with full recovery of glazing materials.
  2. Water Penetration Resistance on Manufactured Assembly: No uncontrolled water on interior face, when tested in accordance with ASTM E331 at pressure differential of 8 psf.
  3. Air Leakage: 0.06 cfm/sq ft maximum leakage of storefront wall area when tested in accordance with ASTM E283/E283M at 1.57 psf pressure difference.

## 2.03 COMPONENTS

- A. Aluminum Framing Members: Tubular aluminum sections, thermally broken with interior section insulated from exterior, drainage holes and internal weep drainage system.
1. Glazing Stops: Flush.
  2. Structurally Reinforced Members: Extruded aluminum with internal reinforcement of structural steel member.
- B. Glazing: As specified in Section 08 80 00.
- C. Swing Doors: Glazed aluminum.
1. Thickness: 1-3/4 inches.
  2. Top Rail: 4 inches wide.
  3. Vertical Stiles: 4-1/2 inches wide.
  4. Bottom Rail: 10 inches wide.
  5. Glazing Stops: Square.
  6. Finish: Same as storefront.
- D. Operable Sash: As specified in Section 08 51 13.

## 2.04 MATERIALS

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Fasteners: Stainless steel.
- C. Glazing Gaskets: Type to suit application to achieve weather, moisture, and air infiltration requirements.

## 2.05 FINISHES

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A44 Electrolytically deposited colored anodic coating not less than 0.7 mils thick.

## 2.06 HARDWARE

- A. For each door, include weatherstripping, sill sweep strip, and threshold.
- B. Other Door Hardware: Storefront manufacturer's standard type to suit application.
1. Finish on Hand-Contacted Items: Polished chrome.
  2. For each door, include pivots, pull handle, exit device, closer, and coordinate with Section 08 71 00 Door Hardware.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify dimensions, tolerances, and method of attachment with other work.

- B. Verify that wall openings and adjoining air and vapor seal materials are ready to receive work of this section.

### **3.02 INSTALLATION**

- A. Install wall system in accordance with manufacturer's instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.
- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances, aligning with adjacent work.
- E. Provide thermal isolation where components penetrate or disrupt building insulation.
- F. Install sill flashings. Turn up ends and edges; seal to adjacent work to form water tight dam.
- G. Where fasteners penetrate sill flashings, make watertight by seating and sealing fastener heads to sill flashing.
- H. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- I. Install operating sash.
- J. Set thresholds in bed of sealant and secure.
- K. Install hardware using templates provided.
  - 1. See Section 08 71 00 for hardware installation requirements.
- L. Install glass and infill panels in accordance with Section 08 80 00, using glazing method required to achieve performance criteria.
- M. Touch-up minor damage to factory applied finish; replace components that cannot be satisfactorily repaired.

### **3.03 TOLERANCES**

- A. Maximum Variation from Plumb: 0.06 inch per 3 feet non-cumulative or 0.06 inch per 10 feet, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.

### **3.04 ADJUSTING**

- A. Adjust operating hardware and sash for smooth operation.

### **3.05 CLEANING**

- A. Remove protective material from pre-finished aluminum surfaces.

### **3.06 PROTECTION**

- A. Protect installed products from damage until Date of Substantial Completion.

**END OF SECTION**

**SECTION 08 45 00  
TRANSLUCENT WALL AND ROOF ASSEMBLIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Self supporting aluminum framed vertical glazing system.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 25 00 - Weather Barriers: Sealing perimeter frame to weather barrier installed on adjacent construction.
- B. Section 07 92 00 - Joint Sealants: Sealing joints between perimeter frame and adjacent construction.

**1.03 REFERENCE STANDARDS**

- A. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site 2015.
- B. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2014 (2015 Errata).
- C. ASTM A36/A36M - Standard Specification for Carbon Structural Steel 2014.
- D. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- E. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- F. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate 2014.
- G. ASTM B209M - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric) 2014.
- H. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2020.
- I. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2013.
- J. ASTM E283/E283M - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen 2019.
- K. ASTM E330/E330M - Standard Test Method for Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference 2014.
- L. ASTM E331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference 2000 (Reapproved 2016).

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, describe components within assembly, anchorage and fasteners, panel configuration, internal drainage details.
- C. Shop Drawings: Indicate system dimensions, framed opening requirements and tolerances, affected related Work, weep drainage network, expansion and contraction joint location and details, and field welding required.
- D. Samples: Submit, illustrating prefinished aluminum surface, specified panel with skins, glazing materials illustrating edge and corner.
- E. Design Data: Show structural and physical characteristics, engineering calculations, and dimensional limitations.
- F. Test Reports: Submit substantiating engineering data, test results of previous tests by independent laboratory which purport to meet performance criteria, and other supportive data.

## 1.05 QUALITY ASSURANCE

- A. Designer Qualifications: Design structural support framing components under direct supervision of a Professional Engineer experienced in design of this work and licensed in the State in which the Project is located.
- B. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of experience.
- C. Installer Qualifications: Company specializing in performing the work of this section with at least three years of experience.

## 1.06 MOCK-UP

- A. Construct a mock-up, 6 feet long by 2 feet wide, include translucent panels, intermediate mullion. Assemble to illustrate component assembly including glazing materials, weep drainage system, attachments, anchors, and perimeter sealant.
- B. Mock-up may remain as part of the Work.

## 1.07 DELIVERY, STORAGE, AND HANDLING

- A. Handle work of this section in accordance with AAMA CW-10.
- B. Protect prefinished aluminum surfaces with wrapping; do not use adhesive papers or sprayed coatings that bond when exposed to sunlight or weather.
  - 1. Puncture wrappings at ends for ventilation.

## PART 2 PRODUCTS

### 2.01 MANUFACTURERS

- A. Cellular Plastic Panel - Translucent Wall Assemblies:
  - 1. Daylyte; Ecowall; [www.dalyteusa.com](http://www.dalyteusa.com).
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

### 2.02 PERFORMANCE REQUIREMENTS

- A. System Design: Design and size components to withstand dead loads and live loads caused by snow, hail, and positive and negative wind loads acting on plane of panel without damage or permanent set.
  - 1. Design Loads: Calculate in accordance with applicable code.
  - 2. Measure performance in accordance with ASTM E330/E330M, using test load of 1.5 times the design wind pressure and 10 second duration of maximum load.
- B. Deflection: Limit mullion deflection to 3/4 inch with full recovery of glazing materials.
- C. System Assembly: Accommodate without damage to system, components or deterioration of seals; movement within system; movement between system and perimeter framing components; dynamic loading and release of loads; deflection of structural support framing, tolerance of supporting components.
- D. Light Transmission: 30 percent.
- E. Thermal Resistance of Panel System (Excluding Vision Areas): R of 4.
- F. Air Leakage: 0.06 cfm/sq ft maximum leakage of sloped glazed area when tested at 1.57 psf pressure difference in accordance with ASTM E283/E283M.
- G. Water Leakage: None, when measured in accordance with ASTM E331 at a test pressure difference of 2.86 lbf/sq ft.
- H. Expansion/Contraction: System to provide for expansion and contraction within system components caused by a cycling temperature range of 170 degrees F over a 12 hour period without causing detrimental effect to system components.
- I. System Internal Drainage: Drain water entering joints, condensation occurring in framing system, or migrating moisture occurring within system, to the exterior by a weep drainage

network.

- J. Fabricate to prevent vibration harmonics, thermal movement transmitted to other building elements, and loosening, weakening, or fracturing of attachments or components of system.

### **2.03 MATERIALS**

- A. Extruded Aluminum: ASTM B221 (ASTM B221M).
- B. Sheet Aluminum: ASTM B209 (ASTM B209M).
- C. Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- D. Steel Sections: ASTM A36/A36M; shaped to suit mullion sections.
- E. Fasteners: Stainless steel.

### **2.04 COMPONENTS**

- A. Translucent Wall System: Extruded plastic cellular panels, with self supporting framing, shop fabricated, factory prefinished, battens, cap strips, related flashings, anchorage and attachment devices.
- B. Panels: Extruded cellular polycarbonate, color as selected by Architect.
  - 1. Type: Flat panel.
- C. Battens, Cover Strips, Cover Plates, and Integral Flashings: Extruded aluminum, to suit location and application; sized to rigidly retain panels in place.
- D. Weather Seals: To suit application; non-bleeding; non-staining.
- E. Sealant for Within Translucent Assembly: As required by manufacturer.
- F. Sill Flashing Sealant: Elastomeric, silicone or polyurethane, and compatible with flashing material.

### **2.05 FABRICATION**

- A. Fabricate system components with minimum clearances and shim spacing around perimeter of assembly, and ensure proper installation and dynamic movement of perimeter seals.
- B. Accurately fit and secure joints and corners. Make joints flush and hairline.
- C. Locate fasteners and attachments to ensure concealment from view.
- D. Reinforce framing members for external imposed loads.

### **2.06 FINISHES**

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick.
- B. Color: To be selected by Architect from manufacturer's standard range.
- C. Concealed Steel Items:
  - 1. Galvanized in accordance with requirements of ASTM A123/A123M.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify dimensions, tolerances, and method of attachment with other work.
- B. Verify wall openings and adjoining air barrier and vapor retarder materials are ready to receive work of this section.

### **3.02 INSTALLATION**

- A. Install translucent panel system with cells vertical in accordance with manufacturer instructions.
- B. Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.
- C. Provide alignment attachments and shims to permanently fasten system to building structure.



- D. Align assembly plumb and level, free of warp or twist. Maintain assembly dimensional tolerances and align with adjacent work.
- E. Install sill flashings.

**3.03 TOLERANCES**

- A. Maximum Variation from Plumb: 0.06 inches every 3 ft non-cumulative or 0.5 inches per 100 ft, whichever is less.
- B. Maximum Misalignment of Two Adjoining Members Abutting in Plane: 1/32 inch.
- C. Sealant Space Between Panel System Members and Adjacent Construction: Maximum of 3/4 inch and minimum of 1/4 inch.

**3.04 CLEANING**

- A. Remove protective material from prefinished aluminum surfaces.

**3.05 PROTECTION**

- A. Protect finished work from damage until Date of Substantial Completion.

**END OF SECTION**

**SECTION 08 51 13  
ALUMINUM WINDOWS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Extruded aluminum windows with operating sash.
  - 1. Operable windows are intended to serve as emergency egress windows from sleeping rooms.
- B. Factory glazing.
- C. Operating hardware.
- D. Insect screens.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 10 00 - Rough Carpentry: Rough opening framing.
- B. Section 07 25 00 - Weather Barriers: Sealing frame to weather barrier installed on adjacent construction.
- C. Section 07 92 00 - Joint Sealants: Sealing joints between window frames and adjacent construction.

**1.03 REFERENCE STANDARDS**

- A. AAMA/WDMA/CSA 101/I.S.2/A440 - North American Fenestration Standard/Specification for Windows, Doors, and Skylights 2017.
- B. AAMA CW-10 - Care and Handling of Architectural Aluminum From Shop to Site 2015.
- C. AAMA 611 - Voluntary Specification for Anodized Architectural Aluminum 2014 (2015 Errata).
- D. ASTM B221 - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes 2020.
- E. ASTM B221M - Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric) 2013.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide component dimensions, information on glass and glazing, internal drainage details, and descriptions of hardware and accessories.
- C. Shop Drawings: Indicate opening dimensions, elevations of different types, framed opening tolerances, method for achieving air and vapor barrier seal to adjacent construction, anchorage locations, and installation requirements.
- D. Samples: Submit sample, 12 by 12 inch in size illustrating typical corner construction, accessories, and finishes.
- E. Submit sample of operating hardware.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Comply with requirements of AAMA CW-10.
- B. Protect finished surfaces with wrapping paper or strippable coating during installation. Do not use adhesive papers or sprayed coatings that bond to substrate when exposed to sunlight or

weather.

### **1.07 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five year manufacturer warranty against failure of glass seal on insulating glass units, including interpane dusting or misting. Include provision for replacement of failed units.

## **PART 2 PRODUCTS**

### **2.01 ALUMINUM WINDOWS**

- A. Aluminum Windows: Extruded aluminum frame and sash, factory fabricated, factory finished, with operating hardware, related flashings, and anchorage and attachment devices.
  - 1. Frame Depth: 3-1/2 inch.
  - 2. Operable Units: Double weatherstripped.
  - 3. Provide units factory glazed.
  - 4. Fabrication: Joints and corners flush, hairline, and weatherproof, accurately fitted and secured; prepared to receive anchors; fasteners and attachments concealed from view; reinforced as required for operating hardware and imposed loads.
  - 5. Perimeter Clearance: Minimize space between framing members and adjacent construction while allowing expected movement.
  - 6. Movement: Accommodate movement between window and perimeter framing and deflection of lintel, without damage to components or deterioration of seals.
  - 7. System Internal Drainage: Drain to the exterior by means of a weep drainage network any water entering joints, condensation occurring in glazing channel, and migrating moisture occurring within system.
  - 8. Egress capability: Refer to Drawings and building code for minimum size requirements and required free area.
- B. Single-Hung Type:
  - 1. Construction: Thermally broken.
  - 2. Provide screens.
  - 3. Glazing: Double; bronze tinted; low-e.
  - 4. Exterior Finish: Class I color anodized.
  - 5. Interior Finish: Class I color anodized.

### **2.02 PERFORMANCE REQUIREMENTS**

- A. Grade: AAMA/WDMA/CSA 101/I.S.2/A440 requirements for specific window type:
  - 1. Performance Class (PC): R.

### **2.03 COMPONENTS**

- A. Frames: 1-3/8 inch wide by 3-1/2 inch deep profile; thermally broken with interior portion of frame insulated from exterior portion; flush glass stops of snap-on type.
- B. Insect Screens: Extruded aluminum frame with mitered and reinforced corners; screen mesh taut and secure to frame; secured to window with adjustable hardware allowing screen removal without use of tools.
  - 1. Hardware: Spring loaded steel pins; four per screen unit.
  - 2. Screen Mesh: Vinyl-coated fiberglass, window manufacturer's standard mesh.
  - 3. Frame Finish: Same as frame and sash.
- C. Operable Sash Weatherstripping: Wool pile; permanently resilient, profiled to achieve effective weather seal.
- D. Sealant for Setting Sills and Sill Flashing: Non-curing butyl type.

### **2.04 MATERIALS**

- A. Extruded Aluminum: ASTM B221 (ASTM B221M), 6063 alloy, T6 temper.

## **2.05 HARDWARE**

- A. Sash lock: Lever handle with cam lock.
- B. Pulls: Manufacturer's standard type.
- C. Limit Stops: Resilient rubber.

## **2.06 FINISHES**

- A. Class I Color Anodized Finish: AAMA 611 AA-M12C22A42 Integrally colored anodic coating not less than 0.7 mils thick.
- B. Finish Color: As selected by Architect from manufacturer's standard range.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that wall openings and adjoining air and vapor seal materials are ready to receive aluminum windows.

### **3.02 INSTALLATION**

- A. Install windows in accordance with manufacturer's instructions.
- B. Attach window frame and shims to perimeter opening to accommodate construction tolerances and other irregularities.
- C. Align window plumb and level, free of warp or twist. Maintain dimensional tolerances and alignment with adjacent work.
- D. Install sill and sill end angles.
- E. Provide thermal isolation where components penetrate or disrupt building insulation. Pack fibrous insulation in shim spaces at perimeter of assembly to maintain continuity of thermal barrier.
- F. Install operating hardware not pre-installed by manufacturer.

### **3.03 ADJUSTING**

- A. Adjust hardware for smooth operation and secure weathertight closure.

### **3.04 CLEANING**

- A. Remove protective material from factory finished aluminum surfaces.
- B. Wash surfaces by method recommended and acceptable to window manufacturer; rinse and wipe surfaces clean.
- C. Remove excess glazing sealant by moderate use of mineral spirits or other solvent acceptable to sealant and window manufacturer.

### **3.05 SCHEDULE**

- A. Refer to Drawings for window type and size.

**END OF SECTION**

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**SECTION 08 71 00  
DOOR HARDWARE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Hardware for wood, aluminum, hollow metal, and sectional doors.
- B. Electrically operated and controlled hardware.
- C. Lock cylinders for doors that hardware is specified in other sections.
- D. Thresholds.
- E. Weatherstripping and gasketing.

**1.02 RELATED REQUIREMENTS**

- A. Section 08 06 71 - Door Hardware Schedule: Schedule of door hardware sets.
- B. Section 08 11 13 - Hollow Metal Doors and Frames.
- C. Section 08 14 16 - Flush Wood Doors.
- D. Section 08 36 13 - Sectional Doors: Door hardware, except cylinders.
- E. Section 08 43 13 - Aluminum-Framed Storefronts: Door hardware, except as noted in section.
- F. Section 28 10 00 - Access Control: Electronic access control devices.

**1.03 REFERENCE STANDARDS**

- A. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- B. BHMA A156.1 - American National Standard for Butts and Hinges 2016.
- C. BHMA A156.2 - American National Standard for Bored and Preassembled Locks & Latches 2017.
- D. BHMA A156.3 - American National Standard for Exit Devices 2014.
- E. BHMA A156.4 - American National Standard for Door Controls - Closers 2013.
- F. BHMA A156.5 - American National Standard for Cylinders and Input Devices for Locks 2014.
- G. BHMA A156.6 - American National Standard for Architectural Door Trim 2015.
- H. BHMA A156.7 - American National Standard for Template Hinge Dimensions 2016.
- I. BHMA A156.8 - American National Standard for Door Controls - Overhead Stops and Holders 2015.
- J. BHMA A156.16 - American National Standard for Auxiliary Hardware 2018.
- K. BHMA A156.21 - American National Standard for Thresholds 2014.
- L. BHMA A156.22 - American National Standard for Door Gasketing and Edge Seal Systems Sponsor 2017.
- M. BHMA A156.25 - American National Standard for Electrified Locking Devices 2018.
- N. BHMA A156.26 - American National Standard for Continuous Hinges 2017.
- O. BHMA A156.28 - American National Standard for Recommended Practices for Mechanical Keying Systems 2018.
- P. BHMA A156.31 - American National Standard for Electric Strikes and Frame Mounted Actuators 2013.
- Q. BHMA A156.115 - American National Standard for Hardware Preparation in Steel Doors and Steel Frames 2016.
- R. BHMA A156.115W - American National Standard for Hardware Preparation in Wood Doors with Wood or Steel Frames 2006.

- S. DHI (H&S) - Sequence and Format for the Hardware Schedule 1996.
- T. DHI (LOCS) - Recommended Locations for Architectural Hardware for Standard Steel Doors and Frames 2004.
- U. DHI WDHS.3 - Recommended Locations for Architectural Hardware for Flush Wood Doors 1993; also in WDHS-1/WDHS-5 Series, 1996.
- V. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.
- W. NFPA 70 - National Electrical Code Most Recent Edition Adopted by Authority Having Jurisdiction, Including All Applicable Amendments and Supplements.
- X. NFPA 80 - Standard for Fire Doors and Other Opening Protectives 2019.
- Y. NFPA 252 - Standard Methods of Fire Tests of Door Assemblies 2017.
- Z. UL (DIR) - Online Certifications Directory Current Edition.
- AA. UL 10C - Standard for Positive Pressure Fire Tests of Door Assemblies Current Edition, Including All Revisions.

#### **1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the manufacture, fabrication, and installation of products that door hardware is installed on.
- B. Furnish templates for door and frame preparation to manufacturers and fabricators of products requiring internal reinforcement for door hardware.
- C. Keying Requirements Meeting:
  - 1. Schedule meeting at project site prior to Owner occupancy.
  - 2. Attendance Required:
    - a. Contractor.
    - b. Owner.
    - c. Architect.
  - 3. Agenda:
    - a. Establish keying requirements.
    - b. Verify locksets and locking hardware are functionally correct for project requirements.
    - c. Verify that keying and programming complies with project requirements.
    - d. Establish keying submittal schedule and update requirements.
  - 4. Incorporate "Keying Requirements Meeting" decisions into keying submittal upon review of door hardware keying system including, but not limited to, the following:
    - a. Access control requirements.
    - b. Schematic diagram of preliminary key system.
  - 5. Record minutes and distribute copies within two days after meeting to participants, with two copies to Architect, Owner, participants, and those affected by decisions made.
  - 6. Deliver established keying requirements to manufacturers.

#### **1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's catalog literature for each type of hardware, marked to clearly show products to be furnished for this project, and includes construction details, material descriptions, finishes, and dimensions and profiles of individual components.
- C. Shop Drawings - Door Hardware Schedule: Submit detailed listing that includes each item of hardware to be installed on each door. Use door numbering scheme as included in Contract Documents.
  - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC).
  - 2. Comply with DHI (H&S) using door numbers and hardware set numbers as indicated in construction documents.

- a. Submit in vertical format, refer to Section 08 0671.
- 3. List groups and suffixes in proper sequence.
- 4. Provide complete description for each door listed.
- 5. Provide manufacturer's and product names, and catalog numbers; include functions, types, styles, sizes and finishes of each item.
- 6. Include account of abbreviations and symbols used in schedule.
- D. Shop Drawings - Electrified Door Hardware: Submit diagrams for power, signal, and control wiring for electrified door hardware that include details of interface with building safety and security systems. Provide elevations and diagrams for each electrified door opening as follows:
  - 1. Prepared by or under supervision of Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC).
  - 2. Elevations: Submit front and back elevations of each door opening showing electrified devices with connections installed and an operations narrative describing how opening operates from either side at any given time.
  - 3. Diagrams: Submit point-to-point wiring diagram that shows each device in door opening system with related colored wire connections to each device.
- E. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- F. Keying Schedule:
  - 1. Submit three (3) copies of Keying Schedule in compliance with requirements established during Keying Requirements Meeting unless otherwise indicated.

#### **1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum three years of experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified for commercial door hardware with at least three years of experience.
- C. Supplier Qualifications: Company with certified Architectural Hardware Consultant (AHC) and Electrified Hardware Consultant (EHC) to assist in work of this section.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Package hardware items individually; label and identify each package with door opening code to match door hardware schedule.

#### **1.08 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Warranty against defects in material and workmanship for period indicated, from Date of Substantial Completion.
  - 1. Closers: Five years, minimum.
  - 2. Exit Devices: Three years, minimum.
  - 3. Locksets and Cylinders: Three years, minimum.
  - 4. Other Hardware: Two years, minimum.

### **PART 2 PRODUCTS**

#### **2.01 DESIGN AND PERFORMANCE CRITERIA**

- A. Provide specified door hardware as required to make doors fully functional, compliant with applicable codes, and secure to extent indicated.
- B. Provide individual items of single type, of same model, and by same manufacturer.
- C. Provide door hardware products that comply with the following requirements:
  - 1. Applicable provisions of federal, state, and local codes.
  - 2. Accessibility: ADA Standards and ICC A117.1.



3. Fire-Rated Doors: NFPA 80, listed and labeled by qualified testing agency for fire protection ratings indicated, based on testing at positive pressure in accordance with NFPA 252 or UL 10C.
  4. Hardware Preparation for Steel Doors and Steel Frames: BHMA A156.115.
  5. Hardware Preparation for Wood Doors with Wood or Steel Frames: BHMA A156.115W.
  6. Products Requiring Electrical Connection: Listed and classified by UL (DIR) as suitable for the purpose specified.
- D. Electrically Operated and/or Controlled Hardware: Provide necessary power supplies, power transfer hinges, relays, and interfaces as required for proper operation; provide wiring between hardware and control components and to building power connection in compliance with NFPA 70.
1. Refer to Section 28 10 00 for additional access control system requirements.
- E. Lock Function: Provide lock and latch function numbers and descriptions of manufacturer's series. Refer to Section 08 0671 for listing of hardware sets.
- F. Fasteners:
1. Provide fasteners of proper type, size, quantity, and finish that comply with commercially recognized standards for proposed applications.
    - a. Aluminum fasteners are not permitted.
    - b. Provide phillips flat-head screws with heads finished to match door surface hardware unless otherwise indicated.
  2. Provide spacers or sex bolts with sleeves for through bolting of hollow metal doors and frames.

## 2.02 HINGES

- A. Hinges: Comply with BHMA A156.1, Grade 1.
1. Butt Hinges: Comply with BHMA A156.1 and BHMA A156.7 for templated hinges.
    - a. Provide hinge width required to clear surrounding trim.
  2. Continuous Hinges: Comply with BHMA A156.26.
  3. Provide hinges on every swinging door.
  4. Provide five-knuckle full mortise butt hinges unless otherwise indicated.
  5. Provide ball-bearing hinges at each door with closer.
  6. Provide following quantity of butt hinges for each door:
    - a. Doors From 60 inches High up to 90 inches High: Three hinges.

## 2.03 FLUSH BOLTS

- A. Flush Bolts: Comply with BHMA A156.16, Grade 1.
1. Flush Bolt Throw: 3/4 inch, minimum.
  2. Provides extension bolts in leading edge of door, one bolt into floor, one bolt into top of frame.
    - a. Pairs of Swing Doors: At inactive leaves, provide flush bolts of type as required to comply with code.
  3. Provide dustproof floor strike for bolt into floor, except at metal thresholds.

## 2.04 EXIT DEVICES

- A. Exit Devices: Comply with BHMA A156.3, Grade 1.
1. Lever design to match lockset trim.
  2. Provide cylinder with cylinder dogging or locking trim.
  3. Provide exit devices properly sized for door width and height.
  4. Provide strike as recommended by manufacturer for application indicated.
  5. Provide less bottom rod (LBR) at scheduled locations to eliminate use of floor mounted strikes.
  6. Provide UL (DIR) listed exit device assemblies for fire-rated doors and panic device assemblies for non-fire-rated doors.

7. For electrical options, provide quick connect plug-in pre-wired connectors.

## **2.05 ELECTRIC STRIKES**

- A. Electric Strikes: Comply with BHMA A156.31, Grade 1.
  1. Provide UL (DIR) listed burglary-resistant electric strike; style to suit locks.
  2. Provide non-handed 24 VDC electric strike suitable for door frame material and scheduled lock configuration.
  3. Provide field selectable Fail Safe/Fail Secure modes.
  4. Provide transformer and rectifier as necessary for complete installation.

## **2.06 LOCK CYLINDERS**

- A. Lock Cylinders: Provide key access on outside of each lock, unless otherwise indicated.
  1. Provide full size interchangeable core (FSIC) type cylinders, Grade 1, with six-pin core in compliance with BHMA A156.5 at locations indicated.
  2. Provide cylinders from same manufacturer as locking device.
  3. Provide cams and/or tailpieces as required for locking devices.
  4. Within specific Door Sections, when provisions for lock cylinder are being referenced to this Section, provide specified lock cylinder and keyed to building keying system, unless otherwise indicated.

## **2.07 CYLINDRICAL LOCKS**

- A. Cylindrical Locks (Bored): Comply with BHMA A156.2, Grade 1, 4000 Series.
  1. Bored Hole: 2-1/8 inch diameter.
  2. Latchbolt Throw: 1/2 inch, minimum.
  3. Backset: 2-3/4 inch unless otherwise indicated.
  4. Strikes: Provide manufacturer's standard strike for each latchset or lockset with strike box and curved lip extending to protect frame in compliance with indicated requirements.
    - a. Finish: To match lock or latch.
  5. Provide a lock for each door, unless otherwise indicated that lock is not required.
  6. Trim: Provide lever handle or pull trim on outside of each lock, unless otherwise indicated.

## **2.08 ELECTROMECHANICAL LOCKS**

- A. Electromechanical Locks: Comply with BHMA A156.25, Grade 1.
  1. Provide motor-driven or solenoid-driven locks, with strike that is applicable to frame.
  2. Type: Mortise deadbolt.

## **2.09 DOOR PULLS AND PUSH PLATES**

- A. Door Pulls and Push Plates: Comply with BHMA A156.6.
  1. Pull Type: Straight, unless otherwise indicated.
  2. Push Plate Type: Flat, with square corners, unless otherwise indicated.
    - a. Edges: Beveled, unless otherwise indicated.
  3. Material: Stainless steel, unless otherwise indicated.
  4. Provide door pulls and push plates on doors without a lockset, latchset, exit device, or auxiliary lock unless otherwise indicated.
  5. On solid doors, provide matching door pull and push plate on opposite faces.

## **2.10 DOOR PULLS AND PUSH BARS**

- A. Door Pulls and Push Bars: Comply with BHMA A156.6.
  1. Bar Type: Bar set, unless otherwise indicated.
  2. Material: Stainless steel, unless otherwise indicated.

## **2.11 CLOSERS**

- A. Closers: Comply with BHMA A156.4, Grade 1.
  1. Type: Surface mounted to door.
  2. Provide door closer on each exterior door.

3. At corridor entry doors, mount closer on room side of door.
4. At outswinging exterior doors, mount closer on interior side of door.

## **2.12 OVERHEAD STOPS AND HOLDERS**

- A. Overhead Stops and Holders (Door Checks): Comply with BHMA A156.8, Grade 1.
  1. Provide stop for every swinging door, unless otherwise indicated.

## **2.13 PROTECTION PLATES**

- A. Protection Plates: Comply with BHMA A156.6.
- B. Metal Properties: Stainless steel.
  1. Metal, Standard Duty: Thickness 0.05 inch, minimum.
  2. Metal, Heavy Duty: Thickness 0.062 inch, minimum.
- C. Edges: Beveled, on four sides unless otherwise indicated.
- D. Fasteners: Countersunk screw fasteners.
- E. Drip Guard: Provide at head of exterior doors unless covered by roof or canopy.

## **2.14 ARMOR PLATES**

- A. Armor Plates: Provide on bottom half of push side of doors that require protection from objects moving through openings that may damage door surface.
  1. Size: 16 inch high by 1-1/2 inch less door width (LDW) on pull side and 2 inch LDW on push side of door.

## **2.15 KICK PLATES**

- A. Kick Plates: Provide along bottom edge of push side of every door with closer, except aluminum storefront and glass entry doors, unless otherwise indicated.
  1. Size: 8 inch high by 2 inch less door width (LDW) on push side of door.

## **2.16 WALL STOPS**

- A. Wall Stops: Comply with BHMA A156.16, Grade 1 and Resilient Material Retention Test as described in this standard.
  1. Type: Bumper, concave, wall stop.
  2. Material: Aluminum housing with rubber insert.

## **2.17 ASTRAGALS**

- A. Astragals: Comply with BHMA A156.22.
  1. Provide surface mounted astragal to cover or fill space for full door height between pair of doors or door and adjacent jamb.
  2. Type: Split, two parts, and with sealing gasket.
  3. Material: Aluminum, with neoprene weatherstripping.
  4. Provide non-corroding fasteners at exterior locations.

## **2.18 THRESHOLDS**

- A. Thresholds: Comply with BHMA A156.21.
  1. Provide threshold at each exterior door, unless otherwise indicated.
  2. Type: Flat surface.
  3. Material: Aluminum.
  4. Threshold Surface: Fluted horizontal grooves across full width.
  5. Field cut threshold to profile of frame and width of door sill for tight fit.
  6. Provide non-corroding fasteners at exterior locations.

## **2.19 WEATHERSTRIPPING AND GASKETING**

- A. Weatherstripping and Gasketing: Comply with BHMA A156.22.
  1. Head and Jamb Type: Adjustable.
  2. Door Sweep Type: Encased in retainer.

3. Material: Aluminum, with brush weatherstripping.
4. Provide weatherstripping on each exterior door at head, jambs, and meeting stiles of door pairs, unless otherwise indicated; .
5. Provide door bottom sweep on each exterior door, unless otherwise indicated.

## **2.20 SILENCERS**

- A. Silencers: Provide at equal locations on door frame to mute sound of door's impact upon closing.
  1. Single Door: Provide three on strike jamb of frame.
  2. Pair of Doors: Provide two on head of frame, one for each door at latch side.
  3. Material: Rubber, gray color.

## **2.21 KEY CABINET**

- A. Key Cabinet: Sheet steel construction, piano hinged door with key lock; BHMA A156.28.
  1. Mounting: Wall-mounted.
  2. Capacity: Actual quantity of keys, plus 25 percent additional capacity.
  3. Size key hooks to hold 6 keys each.
  4. Finish: Baked enamel, manufacturer's standard color.
  5. Key cabinet lock to building keying system.

## **2.22 FINISHES**

- A. Finishes: Identified in Section 08 0671 - Door Hardware Schedule.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that doors and frames are ready to receive this work; labeled, fire-rated doors and frames are properly installed, and dimensions are as indicated on shop drawings.

### **3.02 INSTALLATION**

- A. Install hardware in accordance with manufacturer's instructions and applicable codes.
- B. Install hardware on fire-rated doors and frames in accordance with applicable codes and NFPA 80.
- C. Use templates provided by hardware item manufacturer.
- D. Door Hardware Mounting Heights: Distance from finished floor to center line of hardware item. As indicated in following list; unless noted otherwise in Door Hardware Schedule or on drawings.
  1. For Steel Doors and Frames: Install in compliance with DHI (LOCS) recommendations.
  2. For Wood Doors: Install in compliance with DHI WDHS.3 recommendations.
  3. Mounting heights in compliance with ADA Standards:
- E. Set exterior door thresholds with full-width bead of elastomeric sealant at each point of contact with floor providing a continuous weather seal; anchor thresholds with stainless steel countersunk screws.

### **3.03 ADJUSTING**

- A. Adjust work under provisions of Section 01 70 00 - Execution and Closeout Requirements.
- B. Adjust hardware for smooth operation.
- C. Adjust gasketing for complete, continuous seal; replace if unable to make complete seal.

**END OF SECTION**

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**SECTION 08 80 00  
GLAZING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Insulating glass units.
- B. Glazing units.
- C. Glazing compounds and accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 25 00 - Weather Barriers.
- B. Section 07 92 00 - Joint Sealants: Sealants for other than glazing purposes.
- C. Section 08 11 13 - Hollow Metal Doors and Frames: Glazed lites in doors and borrowed lites.
- D. Section 08 14 16 - Flush Wood Doors: Glazed lites in doors.
- E. Section 08 43 13 - Aluminum-Framed Storefronts: Glazing furnished as part of storefront assembly.
- F. Section 08 83 00 - Mirrors.

**1.03 REFERENCE STANDARDS**

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test 2015.
- C. ASCE 7 - Minimum Design Loads and Associated Criteria for Buildings and Other Structures Most Recent Edition Cited by Referring Code or Reference Standard.
- D. ASTM C864 - Standard Specification for Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers 2005 (Reapproved 2015).
- E. ASTM C1036 - Standard Specification for Flat Glass 2016.
- F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.
- G. ASTM C1193 - Standard Guide for Use of Joint Sealants 2016.
- H. ASTM C1376 - Standard Specification for Pyrolytic and Vacuum Deposition Coatings on Flat Glass 2015.
- I. ASTM E1300 - Standard Practice for Determining Load Resistance of Glass in Buildings 2016.
- J. ASTM E2190 - Standard Specification for Insulating Glass Unit Performance and Evaluation 2010.
- K. GANA (SM) - GANA Sealant Manual 2008.
- L. NFRC 100 - Procedure for Determining Fenestration Product U-factors 2017.
- M. NFRC 200 - Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence 2014, with Errata (2017).
- N. NFRC 300 - Test Method for Determining the Solar Optical Properties of Glazing Materials and Systems 2017.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data on Insulating Glass Unit and Glazing Unit Glazing Types: Provide structural, physical and environmental characteristics, size limitations, special handling and installation requirements.

- C. Product Data on Glazing Compounds and Accessories: Provide chemical, functional, and environmental characteristics, limitations, special application requirements, and identify available colors.
- D. Samples: Submit two samples 12 by 12 inch in size of glass units, showing coloration.

### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.
- B. Installer Qualifications: Company specializing in performing work of the type specified and with at least three years experience.

### **1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Insulating Glass Units: Provide a five (5) year manufacturer warranty to include coverage for seal failure, interpane dusting or misting, including providing products to replace failed units.
- C. Heat Soaked Tempered Glass: Provide a five (5) year manufacturer warranty to include coverage for spontaneous breakage of fully tempered glass caused by nickel sulfide (NiS) inclusions.

## **PART 2 PRODUCTS**

### **2.01 PERFORMANCE REQUIREMENTS - EXTERIOR GLAZING ASSEMBLIES**

- A. Provide type and thickness of exterior glazing assemblies to support assembly dead loads, and to withstand live loads caused by positive and negative wind pressure acting normal to plane of glass.
  - 1. Design Pressure: Calculated in accordance with ASCE 7.
  - 2. Comply with ASTM E1300 for design load resistance of glass type, thickness, dimensions, and maximum lateral deflection of supported glass.
  - 3. Provide glass edge support system sufficiently stiff to limit the lateral deflection of supported glass edges to less than 1/175 of their lengths under specified design load.
  - 4. Glass thicknesses listed are minimum.
- B. Vapor Retarder and Air Barrier Seals: Provide completed assemblies that maintain continuity of building enclosure vapor retarder and air barrier.
  - 1. In conjunction with vapor retarder and joint sealer materials described in other sections.
    - a. Refer to Section 07 25 00.
  - 2. To maintain a continuous vapor retarder and air barrier throughout the glazed assembly from glass pane to heel bead of glazing sealant.
- C. Thermal and Optical Performance: Provide exterior glazing products with performance properties as indicated. Performance properties are in accordance with manufacturer's published data as determined with the following procedures and/or test methods:
  - 1. Center of Glass U-Value: Comply with NFRC 100 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  - 2. Center of Glass Solar Heat Gain Coefficient (SHGC): Comply with NFRC 200 using Lawrence Berkeley National Laboratory (LBNL) WINDOW 6.3 computer program.
  - 3. Solar Optical Properties: Comply with NFRC 300 test method.

### **2.02 GLASS MATERIALS**

- A. Float Glass: Provide float glass based glazing unless otherwise indicated.
  - 1. Annealed Type: ASTM C1036, Type I - Transparent Flat, Class 1 - Clear, Quality - Q3.
  - 2. Kind HS - Heat-Strengthened Type: Complies with ASTM C1048.
  - 3. Kind FT - Fully Tempered Type: Complies with ASTM C1048.
  - 4. Fully Tempered Safety Glass: Complies with ANSI Z97.1 or 16 CFR 1201 criteria for safety glazing used in hazardous locations.

## 2.03 INSULATING GLASS UNITS

- A. Insulating Glass Units: Types as indicated.
  - 1. Durability: Certified by an independent testing agency to comply with ASTM E2190.
  - 2. Coated Glass: Comply with requirements of ASTM C1376 for pyrolytic (hard-coat) or magnetic sputter vapor deposition (soft-coat) type coatings on flat glass; coated vision glass, Kind CV; coated overhead glass, Kind CO; or coated spandrel glass, Kind CS.
  - 3. Nonmetal Edge Spacers: Polypropylene warm-edge technology design.
    - a. Spacer Width: As required for specified insulating glass unit.
    - b. Spacer Height: Manufacturer's standard.
  - 4. Spacer Color: Black.
  - 5. Edge Seal:
    - a. Single-Sealed System: Provide silicone, polysulfide, or polyurethane sealant as seal applied around perimeter.
    - b. Color: Black.
  - 6. Purge interpane space with dry air, hermetically sealed.
  - 7. Capillary Tubes: Provide tubes from air space for insulating glass units without inert type gas that have a change of altitude greater than 2500 feet between point of fabrication and point of installation to permit pressure equalization of air space.
    - a. Capillary Tubes: Tubes to remain open and be of length and material type in accordance with insulating glass fabricator's requirements.
- B. Type GL-1 - Insulating Glass Units: Vision glass, double glazed.
  - 1. Applications: Exterior glazing unless otherwise indicated.
  - 2. Space between lites filled with air.
  - 3. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
    - a. Tint: Blue.
    - b. Coating: Low-E (passive type), on #2 surface.
  - 4. Nonmetal edge spacer.
  - 5. Inboard Lite: Annealed float glass, 1/4 inch thick, minimum.
    - a. Tint: Clear.
  - 6. Total Thickness: 1 inch.
  - 7. Thermal Transmittance (U-Value), Winter - Center of Glass: 0.29, nominal.
  - 8. Visible Light Transmittance (VLT): 42 percent, nominal.
  - 9. Solar Heat Gain Coefficient (SHGC): 0.23, nominal.
- C. Type GL-2 - Insulating Glass Units: Vision glass, double glazed, fully tempered.
  - 1. Applications: Exterior glazing as required for safety locations.
  - 2. Space between lites filled with air.
  - 3. Outboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
    - a. Tint: Blue.
    - b. Coating: Low-E (passive type), on #2 surface.
  - 4. Nonmetal edge spacer.
  - 5. Inboard Lite: Fully tempered float glass, 1/4 inch thick, minimum.
    - a. Tint: Clear.
  - 6. Total Thickness: 1 inch.
  - 7. Thermal Transmittance (U-Value), Winter - Center of Glass: 0.29, nominal.
  - 8. Visible Light Transmittance (VLT): 42 percent, nominal.
  - 9. Solar Heat Gain Coefficient (SHGC): 0.23, nominal.
- D. Type GL-5 - Insulating Glass Units: Vision glass, double glazed, fully tempered.
  - 1. Applications: Overhead sectional doors.
  - 2. Space between lites filled with air.
  - 3. Outboard Lite: Fully tempered float glass, 1/8 inch thick, minimum.
    - a. Tint: Blue.



- b. Coating: Low-E (passive type), on #2 surface.
  - 4. Nonmetal edge spacer.
  - 5. Inboard Lite: Fully tempered float glass, 1/8 inch thick, minimum.
    - a. Tint: Clear.
  - 6. Total Thickness: 1/2 inch.
  - 7. Thermal Transmittance (U-Value), Winter - Center of Glass: 0.29, nominal.
  - 8. Visible Light Transmittance (VLT): 42 percent, nominal.
  - 9. Solar Heat Gain Coefficient (SHGC): 0.23, nominal.
- E. Type GL-6 - Insulating Glass Units: Spandrel glazing.
  - 1. Applications: Exterior spandrel glazing unless otherwise indicated.
  - 2. Space between lites filled with air.
  - 3. Outboard Lite: Annealed float glass, 1/4 inch thick, minimum.
    - a. Tint: Clear.
    - b. Coating: Same as on vision units, on #2 surface.
  - 4. Inboard Lite: Heat-strengthened float glass, 1/4 inch thick.
    - a. Tint: Clear.
    - b. Opacifier: Ceramic frit, on #4 surface.
    - c. Opacifier Color: Black.
  - 5. Total Thickness: 1 inch.
  - 6. Thermal Transmittance (U-Value), Winter - Center of Glass: 0.29, nominal.

#### 2.04 GLAZING UNITS

- A. Type GL-3 - Monolithic Interior Vision Glazing:
  - 1. Applications: Interior glazing unless otherwise indicated.
  - 2. Glass Type: Annealed float glass.
  - 3. Tint: Clear.
  - 4. Thickness: 1/4 inch, nominal.
  - 5. Glazing Method: Dry glazing method, gasket glazing.
- B. Type GL-4 - Monolithic Safety Glazing: Non-fire-rated.
  - 1. Applications:
    - a. Glazed lites in doors, except fire doors.
    - b. Glazed sidelights to doors, except in fire-rated walls and partitions.
    - c. Other locations required by applicable federal, state, and local codes and regulations.
    - d. Other locations indicated on drawings.
  - 2. Glass Type: Fully tempered safety glass as specified.
  - 3. Tint: Clear.
  - 4. Thickness: 1/4 inch, nominal.

#### 2.05 ACCESSORIES

- A. Setting Blocks: Silicone, with 80 to 90 Shore A durometer hardness; ASTM C864 Option II. Length of 0.1 inch for each square foot of glazing or minimum 4 inch by width of glazing rabbet space minus 1/16 inch by height to suit glazing method and pane weight and area.
- B. Glazing Splines: Resilient silicone extruded shape to suit glazing channel retaining slot; ASTM C864 Option II; color black.

### PART 3 EXECUTION

#### 3.01 VERIFICATION OF CONDITIONS

- A. Verify that openings for glazing are correctly sized and within tolerances, including those for size, squareness, and offsets at corners.
- B. Verify that surfaces of glazing channels or recesses are clean, free of obstructions that may impede moisture movement, weeps are clear, and support framing is ready to receive glazing system.

### **3.02 PREPARATION**

- A. Clean contact surfaces with appropriate solvent and wipe dry within maximum of 24 hours before glazing. Remove coatings that are not tightly bonded to substrates.
- B. Seal porous glazing channels or recesses with substrate compatible primer or sealer.
- C. Prime surfaces scheduled to receive sealant where required for proper sealant adhesion.

### **3.03 INSTALLATION, GENERAL**

- A. Install glazing sealants in accordance with ASTM C1193, GANA (SM), and manufacturer's instructions.
- B. Set glass lites in proper orientation so that coatings face exterior or interior as indicated.

### **3.04 INSTALLATION - DRY GLAZING METHOD (GASKET GLAZING)**

- A. Application - Exterior and/or Interior Glazed: Set glazing infills from either the exterior or the interior of the building.
- B. Place setting blocks at 1/4 points with edge block no more than 6 inch from corners.
- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure on gasket to attain full contact.
- D. Install removable stops without displacing glazing gasket; exert pressure for full continuous contact.

### **3.05 CLEANING**

- A. Remove excess glazing materials from finish surfaces immediately after application using solvents or cleaners recommended by manufacturers.
- B. Remove non-permanent labels immediately after glazing installation is complete.
- C. Clean glass and adjacent surfaces after sealants are fully cured.
- D. Clean glass on both exposed surfaces not more than 4 days prior to Date of Substantial Completion in accordance with glass manufacturer's written recommendations.

### **3.06 PROTECTION**

- A. After installation, mark pane with an 'X' by using removable plastic tape or paste; do not mark heat absorbing or reflective glass units.
- B. Remove and replace glass that is damaged during construction period prior to Date of Substantial Completion.

**END OF SECTION**

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**SECTION 09 21 16  
GYPSUM BOARD ASSEMBLIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Metal stud wall framing.
- B. Metal channel ceiling framing.
- C. Acoustic insulation.
- D. Cementitious backing board.
- E. Gypsum wallboard.
- F. Joint treatment and accessories.
- G. Textured finish system.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 10 00 - Rough Carpentry: Building framing and sheathing.
- B. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.
- C. Section 07 92 00 - Joint Sealants: Sealing acoustical gaps in construction other than gypsum board or plaster work.

**1.03 REFERENCE STANDARDS**

- A. AISI S100 - North American Specification for the Design of Cold-Formed Steel Structural Members 2016, with Supplement (2018).
- B. ANSI A108.11 - American National Standard Specifications for Interior Installation of Cementitious Backer Units 2018.
- C. ANSI A118.9 - American National Standard Specifications for Test Methods and Specifications for Cementitious Backer Units 1999 (Reaffirmed 2016).
- D. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- E. ASTM C475/C475M - Standard Specification for Joint Compound and Joint Tape for Finishing Gypsum Board 2017.
- F. ASTM C645 - Standard Specification for Nonstructural Steel Framing Members 2018.
- G. ASTM C665 - Standard Specification for Mineral-Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing 2017.
- H. ASTM C754 - Standard Specification for Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products 2020.
- I. ASTM C840 - Standard Specification for Application and Finishing of Gypsum Board 2020.
- J. ASTM C1002 - Standard Specification for Steel Self-Piercing Tapping Screws for Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs 2020.
- K. ASTM C1047 - Standard Specification for Accessories For Gypsum Wallboard and Gypsum Veneer Base 2019.
- L. ASTM C1288 - Standard Specification for Discrete Non-Asbestos Fiber-Cement Interior Substrate Sheets 2017.
- M. ASTM C1325 - Standard Specification for Fiber-Mat Reinforced Cementitious Backer Units 2019.
- N. ASTM C1396/C1396M - Standard Specification for Gypsum Board 2017.
- O. ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber 2016.

P. GA-216 - Application and Finishing of Gypsum Panel Products 2016.

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements for submittal procedures.
- B. Product Data: Provide data on metal framing, gypsum board, accessories, and joint finishing system.
- C. Product Data: Provide manufacturer's data on partition head to structure connectors, showing compliance with requirements.
- D. Samples: Submit two samples of gypsum board finished with proposed texture application, 12 by 12 inches in size, illustrating finish color and texture.

#### **1.05 QUALITY ASSURANCE**

- A. Installer Qualifications: Company specializing in performing gypsum board installation and finishing, with minimum 5 years of experience.
- B. Manufacturer Qualifications: Member of Steel Stud Manufacturers Association (SSMA): [www.ssma.com/#sle](http://www.ssma.com/#sle).

### **PART 2 PRODUCTS**

#### **2.01 GYPSUM BOARD ASSEMBLIES**

- A. Provide completed assemblies complying with ASTM C840 and GA-216.
  - 1. See PART 3 for finishing requirements.

#### **2.02 METAL FRAMING MATERIALS**

- A. Non-structural Framing System Components: ASTM C645; galvanized sheet steel, of size and properties necessary to comply with ASTM C754 for the spacing indicated, with maximum deflection of wall framing of L/120 at 5 psf.
  - 1. Studs: C-shaped with knurled or embossed faces.
  - 2. Runners: U shaped, sized to match studs.
  - 3. Ceiling Channels: C-shaped.
  - 4. Furring Members: Hat-shaped sections, minimum depth of 7/8 inch.
- B. Partition Head to Structure Connections: Provide mechanical anchorage devices that accommodate deflection using slotted holes, screws, and anti-friction bushings, preventing rotation of studs while maintaining structural performance of partition.
  - 1. Structural Performance: Maintain lateral load resistance and vertical movement capacity required by applicable code, when evaluated in accordance with AISI S100.
  - 2. Material: ASTM A653/A653M steel sheet, SS Grade 50/340, with G60/Z180 hot-dipped galvanized coating.

#### **2.03 BOARD MATERIALS**

- A. Gypsum Wallboard: Paper-faced gypsum panels as defined in ASTM C1396/C1396M; sizes to minimize joints in place; ends square cut.
  - 1. Application: Use for vertical surfaces and ceilings, unless otherwise indicated.
  - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.
    - a. Mold-resistant board is required whenever board is being installed before the building is enclosed and conditioned.
  - 3. Thickness:
    - a. Vertical Surfaces: 5/8 inch.
    - b. Ceilings: 5/8 inch.
- B. Backing Board For Wet Areas: One of the following products:
  - 1. Application: Surfaces behind tile in wet areas including tub and shower surrounds and restroom "wet" walls.
  - 2. Mold Resistance: Score of 10, when tested in accordance with ASTM D3273.

3. ANSI Cement-Based Board: Non-gypsum-based; aggregated Portland cement panels with glass fiber mesh embedded in front and back surfaces complying with ANSI A118.9 or ASTM C1325.
  - a. Thickness: 1/2 inch.
4. ASTM Cement-Based Board: Non-gypsum-based, cementitious board complying with ASTM C1288.
  - a. Thickness: 1/2 inch.

## **2.04 GYPSUM WALLBOARD ACCESSORIES**

- A. Acoustic Insulation: ASTM C665; preformed glass fiber, friction fit type, unfaced. Thickness: as indicated on drawings inch.
- B. Acoustic Sealant: Acrylic emulsion latex or water-based elastomeric sealant; do not use solvent-based non-curing butyl sealant.
  1. Products:
    - a. Franklin International, Inc; Titebond GREENchoice Professional Acoustical Smoke and Sound Sealant: [www.titebond.com/#sle](http://www.titebond.com/#sle).
    - b. Liquid Nails, a brand of PPG Architectural Coatings; Acoustical Sound Sealant: [www.liquidnails.com/#sle](http://www.liquidnails.com/#sle).
    - c. Specified Technologies Inc; Smoke N Sound Acoustical Sealant: [www.stifirestop.com/#sle](http://www.stifirestop.com/#sle).
    - d. USG: Sheetrock Brand Acoustical Sealant: [www.usg.com](http://www.usg.com).
    - e. Substitutions: See Section 01 60 00 - Product Requirements.
- C. Beads, Joint Accessories, and Other Trim: ASTM C1047, rigid plastic, galvanized steel, or rolled zinc, unless noted otherwise.
  1. Splayed Corner Beads with Paper Face: 90 degree outside corner.
  2. L-Trim with Tear-Away Strip: Sized to fit 1/2 inch thick gypsum wallboard.
  3. Expansion Joints:
    - a. Type: V-shaped metal with factory-installed protective tape.
- D. Joint Materials: ASTM C475/C475M and as recommended by gypsum board manufacturer for project conditions.
  1. Paper Tape: 2 inch wide, creased paper tape for joints and corners, except as otherwise indicated.
  2. Joint Compound: Drying type, vinyl-based, ready-mixed.
- E. Textured Finish Materials: Latex- or Vinyl-based compound; plain.
- F. Screws for Fastening of Gypsum Panel Products to Cold-Formed Steel Studs Less than 0.033 inches in Thickness and Wood Members: ASTM C1002; self-piercing tapping screws, corrosion-resistant.
- G. Anchorage to Substrate: Tie wire, nails, screws, and other metal supports, of type and size to suit application; to rigidly secure materials in place.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that project conditions are appropriate for work of this section to commence.

### **3.02 FRAMING INSTALLATION**

- A. Metal Framing: Install in accordance with ASTM C754 and manufacturer's instructions.
- B. Suspended Ceilings and Soffits: Space framing and furring members as indicated.
- C. Studs: Space studs at 16 inches on center.
  1. Extend partition framing to structure where indicated and to ceiling in other locations.
  2. Partitions Terminating at Ceiling: Attach ceiling runner securely to ceiling track in accordance with manufacturer's instructions.

3. Partitions Terminating at Structure: Attach top runner to structure, maintain clearance between top of studs and structure, and connect studs to track using specified mechanical devices in accordance with manufacturer's instructions; verify free movement of top of stud connections; do not leave studs unattached to track.
- D. Openings: Reinforce openings as required for weight of doors or operable panels, using not less than double studs at jambs.

### **3.03 ACOUSTIC ACCESSORIES INSTALLATION**

- A. Acoustic Insulation: Place tightly within spaces, around cut openings, behind and around electrical and mechanical items within partitions, and tight to items passing through partitions.
- B. Acoustic Sealant: Install in accordance with manufacturer's instructions.

### **3.04 BOARD INSTALLATION**

- A. Comply with ASTM C840, GA-216, and manufacturer's instructions. Install to minimize butt end joints, especially in highly visible locations.
- B. Cementitious Backing Board: Install over steel framing members and plywood substrate where indicated, in accordance with ANSI A108.11 and manufacturer's instructions.

### **3.05 INSTALLATION OF TRIM AND ACCESSORIES**

- A. Control Joints: Place control joints consistent with lines of building spaces and as indicated.
  1. Not more than 30 feet apart on walls and ceilings over 50 feet long.
- B. Corner Beads: Install at external corners, using longest practical lengths.
- C. Edge Trim: Install at locations where gypsum board abuts dissimilar materials.

### **3.06 JOINT TREATMENT**

- A. Finish gypsum board in accordance with levels defined in ASTM C840, as follows:
  1. Level 4: Walls and ceilings to receive paint finish or wall coverings, unless otherwise indicated.
  2. Level 2: In utility areas, behind cabinetry, and on backing board to receive tile finish.
  3. Level 1: In areas above finished ceilings, whether or not accessible in the completed construction.
- B. Tape, fill, and sand exposed joints, edges, and corners to produce smooth surface ready to receive finishes.
  1. Feather coats of joint compound so that camber is maximum 1/32 inch.
  2. Taping, filling, and sanding are not required at surfaces behind adhesive applied ceramic tile and fixed cabinetry.

### **3.07 TEXTURE FINISH**

- A. Apply finish texture coating by means of spraying apparatus in accordance with manufacturer's instructions and to match approved sample.

### **3.08 TOLERANCES**

- A. Maximum Variation of Finished Gypsum Board Surface from True Flatness: 1/8 inch in 10 feet in any direction.

**END OF SECTION**

**SECTION 09 30 00  
TILING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Tile for floor applications.
- B. Tile for wall applications.
- C. Thresholds.
- D. Ceramic trim.
- E. Non-ceramic trim.

**1.02 RELATED REQUIREMENTS**

- A. Section 07 92 00 - Joint Sealants: Sealing joints between tile work and adjacent construction and fixtures.
- B. Section 09 21 16 - Gypsum Board Assemblies: Tile backer board.

**1.03 REFERENCE STANDARDS**

- A. ANSI A108.1a - American National Standard Specifications for Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar 2017.
- B. ANSI A108.1b - American National Standard Specifications for Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar 2017.
- C. ANSI A108.1c - Specifications for Contractors Option: Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Bed with Dry-Set or Latex-Portland Cement 1999 (Reaffirmed 2016).
- D. ANSI A108.2 - American National Standard General Requirements: Materials, Environmental and Workmanship 2019.
- E. ANSI A108.4 - American National Standard Specifications for Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile-Setting Epoxy Adhesive 2009 (Revised).
- F. ANSI A108.5 - American National Standard Specifications for Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar 1999 (Reaffirmed 2010).
- G. ANSI A108.6 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and -Grouting Epoxy 1999 (Reaffirmed 2010).
- H. ANSI A108.8 - American National Standard Specifications for Installation of Ceramic Tile with Chemical Resistant Furan Resin Mortar and Grout 1999 (Reaffirmed 2010).
- I. ANSI A108.9 - American National Standard Specifications for Installation of Ceramic Tile with Modified Epoxy Emulsion Mortar/Grout 1999 (Reaffirmed 2010).
- J. ANSI A108.10 - American National Standard Specifications for Installation of Grout in Tilework 2017.
- K. ANSI A108.12 - American National Standard for Installation of Ceramic Tile with EGP (Exterior Glue Plywood) Latex-Portland Cement Mortar 1999 (Reaffirmed 2010).
- L. ANSI A108.13 - American National Standard for Installation of Load Bearing, Bonded, Waterproof Membranes for Thin-Set Ceramic Tile and Dimension Stone 2005 (Reaffirmed 2016).
- M. ANSI A108.19 - American National Standard Specifications for Interior Installation of Gauged Porcelain Tiles and Gauged Porcelain Tile Panels/Slabs by the Thin-Bed Method Bonded with Modified Dry-Set Cement Mortar or Improved Modified Dry-Set Cement Mortar 2017.



- N. ANSI A118.4 - American National Standard Specifications for Modified Dry-Set Cement Mortar 2012 (Revised).
- O. ANSI A118.7 - American National Standard Specifications for High Performance Cement Grouts for Tile Installation 2010 (Reaffirmed 2016).
- P. ANSI A118.12 - American National Standard Specifications for Crack Isolation Membranes for Thin-Set Ceramic Tile and Dimension Stone Installation 2014.
- Q. ANSI A137.1 - American National Standard Specifications for Ceramic Tile 2019.
- R. ASTM C373 - Standard Test Methods for Determination of Water Absorption and Associated Properties by Vacuum Method for Pressed Ceramic Tiles and Glass Tiles and Boil Method for Extruded Ceramic Tiles and Non-tile Fired Ceramic Whiteware Products 2018.
- S. TCNA (HB) - Handbook for Ceramic, Glass, and Stone Tile Installation 2019.

#### **1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturers' data sheets on tile, mortar, grout, and accessories. Include instructions for using grouts and adhesives.
- C. Shop Drawings: Indicate perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, ceramic accessories, and setting details.
- D. Maintenance Data: Include recommended cleaning methods, cleaning materials, and stain removal methods.
- E. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Tile: 1 percent of each size, color, and surface finish combination, but not less than 10 square feet of each type (except trim units)

#### **1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the types of products specified in this section, with minimum five years of experience.
- B. Installer Qualifications:
  - 1. Company specializing in performing tile installation, with minimum of five years of experience.

#### **1.06 MOCK-UP**

- A. See Section 01 40 00 - Quality Requirements, for general requirements for mock-up.
- B. Construct tile mock-up where directed, incorporating all components specified for the location.
  - 1. Approved mock-up may remain as part of the Work.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

#### **1.08 FIELD CONDITIONS**

- A. Maintain ambient and substrate temperature above 50 degrees F and below 100 degrees F during installation and curing of setting materials.

### **PART 2 PRODUCTS**

#### **2.01 TILE**

- A. Manufacturers: All products by the same manufacturer.
- B. Porcelain Tile, Type PT1: ANSI A137.1 standard grade.
  - 1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
  - 2. Size: as shown on drawings inch, nominal.
  - 3. Thickness: 3/8 inch.

4. Edges: Cushioned.
  5. Surface Finish: Per selection indicated on Drawings.
  6. Color(s): As indicated on drawings.
  7. Pattern: As indicated on drawings.
  8. Trim Units: Matching bullnose, double bullnose, cove base, and cove shapes in sizes coordinated with field tile.
  9. Products:
    - a. Landmark Ceramics.
- C. Porcelain Tile, Type PT2: ANSI A137.1 standard grade.
1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
  2. Size: as shown on drawings inch, nominal.
  3. Thickness: 3/8 inch.
  4. Edges: Cushioned.
  5. Surface Finish: Per selection indicated on Drawings.
  6. Color(s): As indicated on drawings.
  7. Pattern: As indicated on drawings.
  8. Trim Units: Matching bullnose, double bullnose, cove base, and cove shapes in sizes coordinated with field tile.
  9. Products:
    - a. Landmark Ceramics.
- D. Porcelain Tile, Type PT3: ANSI A137.1 standard grade.
1. Moisture Absorption: 0 to 0.5 percent as tested in accordance with ASTM C373.
  2. Size: as shown on drawings inch, nominal.
  3. Thickness: 3/8 inch.
  4. Edges: Cushioned.
  5. Surface Finish: Per selection indicated on Drawings.
  6. Color(s): As indicated on drawings.
  7. Pattern: As indicated on drawings.
  8. Trim Units: Matching bullnose, double bullnose, cove base, and cove shapes in sizes coordinated with field tile.
  9. Products:
    - a. Iris Ceramica.

## 2.02 TRIM AND ACCESSORIES

- A. Ceramic Accessories: Glazed finish, same color and finish as adjacent field tile; same manufacturer as tile.
- B. Ceramic Trim: Matching bullnose, double bullnose, cove base, and cove ceramic shapes in sizes coordinated with field tile.
  1. Applications:
    - a. Open Edges: Bullnose.
    - b. Inside Corners: Jointed.
    - c. Floor to Wall Joints: Cove base.
  2. Manufacturers: Same as for tile.
- C. Non-Ceramic Trim: Satin natural anodized extruded aluminum, style and dimensions to suit application, for setting using tile mortar or adhesive.
  1. Applications:
    - a. Transition between floor finishes of different heights.
    - b. Thresholds at door openings.
    - c. Expansion and control joints, floor and wall.
    - d. Borders and other trim as indicated on drawings.
  2. Manufacturers:

- a. Schluter-Systems: [www.schluter.com/#sle](http://www.schluter.com/#sle).
  - b. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Thresholds: 2 inches wide by full width of wall or frame opening; beveled edge on both long edges; without holes, cracks, or open seams.
- 1. Thickness: 1/2 inch.
  - 2. Material: Solid surface acrylic resin, mineral filler, and pigments; non-porous, color and pattern consistent throughout thickness.
  - 3. Color and Pattern: As selected by Architect.
  - 4. Applications:
    - a. At doorways where tile terminates.
    - b. At open edges of floor tile where adjacent finish is a different height.

### 2.03 SETTING MATERIALS

- A. Provide setting and grout materials from same manufacturer.
- B. Latex-Portland Cement Mortar Bond Coat: ANSI A118.4.
  - 1. Applications: Use this type of bond coat where indicated, and where no other type of bond coat is indicated.

### 2.04 GROUTS

- A. Provide setting and grout materials from same manufacturer.
- B. High Performance Polymer Modified Grout: ANSI A118.7 polymer modified cement grout.
  - 1. Applications: Use this type of grout where indicated and where no other type of grout is indicated.
  - 2. Use sanded grout for joints 1/8 inch wide and larger; use unsanded grout for joints less than 1/8 inch wide.
  - 3. Color(s): As selected by Architect from manufacturer's full line.

### 2.05 MAINTENANCE MATERIALS

- A. Tile Sealant: Gunnable, silicone, siliconized acrylic, or urethane sealant; moisture and mildew resistant type.
  - 1. Applications: Between tile and plumbing fixtures.
  - 2. Color(s): Color matched to grout.

### 2.06 ACCESSORY MATERIALS

- A. Concrete Floor Slab Crack Isolation Membrane: Material complying with ANSI A118.12; not intended as waterproofing.
  - 1. Crack Resistance: No failure at 1/8 inch gap, minimum.
  - 2. Fluid or Trowel Applied Type:
    - a. Material: Synthetic rubber or Acrylic.
    - b. Thickness: 20 mils, maximum.

## PART 3 EXECUTION

### 3.01 EXAMINATION

- A. Verify that subfloor surfaces are smooth and flat within the tolerances specified for that type of work and are ready to receive tile.
- B. Verify that wall surfaces are smooth and flat within the tolerances specified for that type of work, are dust-free, and are ready to receive tile.
- C. Verify that subfloor surfaces are dust free and free of substances that could impair bonding of setting materials to subfloor surfaces.
- D. Cementitious Subfloor Surfaces: Verify that substrates are ready for tiling installation by testing for moisture and alkalinity (pH).
  - 1. Test in accordance with Section 09 05 61.

2. Obtain instructions if test results are not within limits recommended by tiling material manufacturer and setting material manufacturer.

### **3.02 PREPARATION**

- A. Protect surrounding work from damage.
- B. Vacuum clean surfaces and damp clean.
- C. Seal substrate surface cracks with filler. Level existing substrate surfaces to acceptable flatness tolerances.

### **3.03 INSTALLATION - GENERAL**

- A. Install tile and thresholds and grout in accordance with applicable requirements of ANSI A108.1a through ANSI A108.19 , manufacturer's instructions, and TCNA (HB) recommendations.
- B. Lay tile to pattern indicated. Do not interrupt tile pattern through openings.
- C. Cut and fit tile to penetrations through tile, leaving sealant joint space. Form corners and bases neatly. Align floor joints.
- D. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make grout joints without voids, cracks, excess mortar or excess grout, or too little grout.
- E. Form internal angles square and external angles bullnosed.
- F. Install non-ceramic trim in accordance with manufacturer's instructions.
- G. Install thresholds where indicated.
- H. Sound tile after setting. Replace hollow sounding units.
- I. Keep control and expansion joints free of mortar, grout, and adhesive.
- J. Prior to grouting, allow installation to completely cure; minimum of 48 hours.
- K. Grout tile joints unless otherwise indicated. Use standard grout unless otherwise indicated.
- L. At changes in plane and tile-to-tile control joints, use tile sealant instead of grout, with either bond breaker tape or backer rod as appropriate to prevent three-sided bonding.

### **3.04 INSTALLATION - FLOORS - THIN-SET METHODS**

- A. Over interior concrete substrates, install in accordance with TCNA (HB) Method F113, dry-set or latex-Portland cement bond coat, with standard grout, unless otherwise indicated.
  1. Use uncoupling membrane under all tile unless other underlayment is indicated.

### **3.05 INSTALLATION - WALL TILE**

- A. Over cementitious backer units on studs, install in accordance with TCNA (HB) Method W244, using membrane at toilet rooms.

### **3.06 CLEANING**

- A. Clean tile and grout surfaces.

### **3.07 PROTECTION**

- A. Do not permit traffic over finished floor surface for 4 days after installation.

### **3.08 SCHEDULE**

- A. Refer to Drawings.

**END OF SECTION**

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**SECTION 09 51 00  
ACOUSTICAL CEILINGS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Suspended metal grid ceiling system.
- B. Acoustical units.

**1.02 REFERENCE STANDARDS**

- A. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- B. ASTM C635/C635M - Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings 2017.
- C. ASTM E1264 - Standard Classification for Acoustical Ceiling Products 2019.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on suspension system components and acoustical units.
- C. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.

**1.04 QUALITY ASSURANCE**

- A. Suspension System Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.
- B. Acoustical Unit Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years experience.

**1.05 FIELD CONDITIONS**

- A. Maintain uniform temperature of minimum 60 degrees F, and maximum humidity of 40 percent prior to, during, and after acoustical unit installation.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Acoustic Tiles/Panels:
  - 1. Armstrong World Industries, Inc; Ultima, 1941: [www.armstrongceilings.com/#sle](http://www.armstrongceilings.com/#sle).
  - 2. USG Corporation; Mars Acoustical: [www.usg.com/ceilings/#sle](http://www.usg.com/ceilings/#sle).
  - 3. Substitutions: See Section 01 60 00 - Product Requirements.
- B. Suspension Systems:
  - 1. Same as for acoustical units.

**2.02 ACOUSTICAL UNITS**

- A. Acoustical Units - General: ASTM E1264, Class A.
- B. Acoustical Panels, Type AM: Mineral fiber with membrane-faced overlay, with the following characteristics:
  - 1. Classification: ASTM E1264 Type IV.
  - 2. Size: 24 by 24 inches.
  - 3. Thickness: 7/8 inches.
  - 4. NRC Range: 0.75 to 0.85, determined in accordance with ASTM E1264.
  - 5. Ceiling Attenuation Class (CAC): 35, determined in accordance with ASTM E1264.
  - 6. Panel Edge: Tegular.
  - 7. Tile Edge: Beveled.
  - 8. Color: White.

9. Suspension System: Exposed grid.
10. Products:
  - a. Armstrong World Industries, Inc; Ultima: [www.armstrongceilings.com/#sle](http://www.armstrongceilings.com/#sle).
  - b. USG Corporation; Mars Acoustical Panels: [www.usg.com/ceilings/#sle](http://www.usg.com/ceilings/#sle).
  - c. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.03 SUSPENSION SYSTEM(S)**

- A. Metal Suspension Systems - General: Complying with ASTM C635/C635M; die cut and interlocking components, with perimeter moldings, hold down clips, stabilizer bars, clips, and splices as required.
  1. Materials:
    - a. Steel Grid: ASTM A653/A653M, G30 coating, unless otherwise indicated.
- B. Exposed Suspension System, Type AM: Hot-dipped galvanized steel grid with aluminum cap.
  1. Application(s): Seismic.
  2. Structural Classification: Intermediate-duty, when tested in accordance with ASTM C635/C635M.
  3. Profile: Tee; 15/16 inch face width.
  4. Finish: Baked enamel.
  5. Color: White.
  6. Products:
    - a. USG Corporation; Donn Brand ZXLA 15/16 inch Acoustical Suspension System: [www.usg.com/ceilings/#sle](http://www.usg.com/ceilings/#sle).
    - b. Armstrong Ceiling Solutions; Prelude XL.
    - c. Substitutions: See Section 01 60 00 - Product Requirements.

### **2.04 ACCESSORIES**

- A. Support Channels and Hangers: Galvanized steel; size and type to suit application and ceiling system flatness requirement specified.
- B. Hanger Wire: 12 gauge, 0.08 inch galvanized steel wire.
- C. Hold-Down Clips: Manufacturer's standard clips to suit application.
- D. Seismic Clips: Manufacturer's standard clips for seismic conditions and to suit application.
- E. Perimeter Moldings: Same metal and finish as grid.
  1. Shadow Molding: Shaped to create a perimeter reveal.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify that layout of hangers will not interfere with other work.

### **3.02 PREPARATION**

- A. Install after major above-ceiling work is complete.
- B. Coordinate the location of hangers with other work.

### **3.03 INSTALLATION - SUSPENSION SYSTEM**

- A. Rigidly secure system, including integral mechanical and electrical components, for maximum deflection of 1:360.
- B. Lay out system to a balanced grid design with edge units no less than 50 percent of acoustical unit size.
- C. Perimeter Molding: Install at intersection of ceiling and vertical surfaces and at junctions with other interruptions.
  1. Use longest practical lengths.

- D. Suspension System, Non-Seismic: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Where carrying members are spliced, avoid visible displacement of face plane of adjacent members.
- E. Seismic Suspension System, Seismic Design Category C: Hang suspension system independent of walls, columns, ducts, pipes and conduit. Maintain a 3/8 inch clearance between grid ends and wall.
- F. Where ducts or other equipment prevent the regular spacing of hangers, reinforce the nearest affected hangers and related carrying channels to span the extra distance.
- G. Do not support components on main runners or cross runners if weight causes total dead load to exceed deflection capability.
- H. Support fixture loads using supplementary hangers located within 6 inches of each corner, or support components independently.
- I. Do not eccentrically load system or induce rotation of runners.

### **3.04 INSTALLATION - ACOUSTICAL UNITS**

- A. Install acoustical units in accordance with manufacturer's instructions.
- B. Fit acoustical units in place, free from damaged edges or other defects detrimental to appearance and function.
- C. Fit border trim neatly against abutting surfaces.
- D. Install acoustical units level, in uniform plane, and free from twist, warp, and dents.
- E. Cutting Acoustical Units:
  - 1. Make field cut edges of same profile as factory edges.
- F. Install hold-down clips on panels within 20 ft of an exterior door.

### **3.05 TOLERANCES**

- A. Maximum Variation from Flat and Level Surface: 1/8 inch in 10 feet.
- B. Maximum Variation from Plumb of Grid Members Caused by Eccentric Loads: 2 degrees.

### **3.06 SCHEDULE**

- A. Refer to Drawings.

**END OF SECTION**



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**SECTION 09 65 00  
RESILIENT FLOORING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Resilient tile flooring.
- B. Resilient base.
- C. Installation accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Restrictions on curing compounds for concrete slabs and floors to receive adhesive-applied resilient flooring.
- B. Section 09 05 61 - Common Work Results for Flooring Preparation: Removal of existing floor coverings, cleaning, and preparation.
- C. Section 09 05 61 - Common Work Results for Flooring Preparation: Concrete slab moisture and alkalinity testing and remediation procedures.

**1.03 REFERENCE STANDARDS**

- A. ASTM D6329 - Standard Guide for Developing Methodology for Evaluating the Ability of Indoor Materials to Support Microbial Growth Using Static Environmental Chambers 1998 (Reapproved 2015).
- B. ASTM E648 - Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source 2019a, with Editorial Revision (2020).
- C. ASTM F1700 - Standard Specification for Solid Vinyl Floor Tile 2020.
- D. ASTM F1861 - Standard Specification for Resilient Wall Base 2016.
- E. NFPA 253 - Standard Method of Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source 2019.
- F. UL 2824 - GREENGUARD Certification Program Method for Measuring Microbial Resistance From Various Sources Using Static Environmental Chambers Current Edition, Including All Revisions.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; including sizes, patterns and colors available; and installation instructions.
- C. Selection Samples: Submit manufacturer's complete set of color samples for Architect's initial selection.
- D. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Flooring Material: 100 square feet of each type and color.
  - 3. Extra Wall Base: 50 linear feet of each type and color.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing specified flooring with minimum three years experience.
- B. Installer Qualifications: Company specializing in installing specified flooring with minimum three years experience.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Upon receipt, immediately remove any shrink-wrap and check materials for damage and the correct style, color, quantity and run numbers.

- B. Store all materials off of the floor in an acclimatized, weather-tight space.
- C. Protect roll materials from damage by storing on end.
- D. Do not double stack pallets.

### **1.07 FIELD CONDITIONS**

- A. Store materials for not less than 48 hours prior to installation in area of installation at a temperature of 70 degrees F to achieve temperature stability. Thereafter, maintain conditions above 55 degrees F.

## **PART 2 PRODUCTS**

### **2.01 TILE FLOORING**

- A. Vinyl Tile - Type LVT: Solid vinyl with color and pattern throughout thickness.
  - 1. Manufacturers:
    - a. Mannington: Nature's Path Collection / Wood.
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
  - 2. Minimum Requirements: Comply with ASTM F1700, of Class corresponding to type specified.
  - 3. Critical Radiant Flux (CRF): Minimum 0.45 watt per square centimeter, when tested in accordance with ASTM E648 or NFPA 253.
  - 4. Mold and Microbial Resistance: Highly resistant when tested in accordance with ASTM D6329; certified in accordance with UL 2824.
  - 5. Plank Tile Size: 4 by 36 inch.
  - 6. Wear Layer Thickness: 0.020 inch.
  - 7. Total Thickness: 0.100 inch.
  - 8. Color: To be selected by Architect from manufacturer's full range.

### **2.02 RESILIENT BASE**

- A. Resilient Base - Type RB: ASTM F1861, Type TS rubber, vulcanized thermoset; style as scheduled.
  - 1. Height: 4 inch.
  - 2. Thickness: 0.125 inch.
  - 3. Finish: Satin.
  - 4. Length: Roll.
  - 5. Color: To be selected by Architect from manufacturer's standard range.

### **2.03 ACCESSORIES**

- A. Subfloor Filler: Type recommended by adhesive material manufacturer.
- B. Primers and Adhesives: Waterproof; types recommended by flooring manufacturer.
- C. Moldings, Transition and Edge Strips: Metal.
  - 1. See Section 09 05 61 - Common Results for Flooring Preparation.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that surfaces are flat to tolerances acceptable to flooring manufacturer, free of cracks that might telegraph through flooring, clean, dry, and free of curing compounds, surface hardeners, and other chemicals that might interfere with bonding of flooring to substrate.
- B. Cementitious Subfloor Surfaces: Verify that substrates are ready for resilient flooring installation by testing for moisture and alkalinity (pH).
  - 1. Test in accordance with Section 09 05 61.
  - 2. Obtain instructions if test results are not within limits recommended by resilient flooring manufacturer and adhesive materials manufacturer.

### **3.02 PREPARATION**

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove subfloor ridges and bumps. Fill minor low spots, cracks, joints, holes, and other defects with subfloor filler to achieve smooth, flat, hard surface.
- C. Prohibit traffic until filler is fully cured.

### **3.03 INSTALLATION - GENERAL**

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install in accordance with manufacturer's written instructions.
- C. Adhesive-Applied Installation:
  - 1. Spread only enough adhesive to permit installation of materials before initial set.
  - 2. Fit joints and butt seams tightly.
  - 3. Set flooring in place, press with heavy roller to attain full adhesion.
- D. Where type of floor finish, pattern, or color are different on opposite sides of door, terminate flooring under centerline of door.
- E. Install edge strips at unprotected or exposed edges, where flooring terminates, and where indicated.
  - 1. Metal Strips: Attach to substrate before installation of flooring using stainless steel screws.
- F. Scribe flooring to walls, columns, cabinets, floor outlets, and other appurtenances to produce tight joints.

### **3.04 INSTALLATION - TILE FLOORING**

- A. Mix tile from container to ensure shade variations are consistent when tile is placed, unless otherwise indicated in manufacturer's installation instructions.
- B. Install tile to ashlar pattern as indicated on drawings. Allow minimum 1/2 full size tile width at room or area perimeter.
- C. Install plank tile with a random offset of at least 6 inches from adjacent rows.

### **3.05 INSTALLATION - RESILIENT BASE**

- A. Fit joints tightly and make vertical. Maintain minimum dimension of 18 inches between joints.
- B. Install base on solid backing. Bond tightly to wall and floor surfaces.
- C. Scribe and fit to door frames and other interruptions.

### **3.06 CLEANING**

- A. Remove excess adhesive from floor, base, and wall surfaces without damage.
- B. Clean in accordance with manufacturer's written instructions.

### **3.07 PROTECTION**

- A. Prohibit traffic on resilient flooring for 48 hours after installation.

**END OF SECTION**

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**SECTION 09 68 13  
TILE CARPETING**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Carpet tile, fully adhered.

**1.02 REFERENCE STANDARDS**

- A. ASTM F710 - Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring 2019, with Editorial Revision (2020).
- B. ASTM F1869 - Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride 2016a.
- C. ASTM F2170 - Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes 2019a.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on specified products, describing physical and performance characteristics; sizes, patterns, colors available, and method of installation.
- C. Samples: Submit two carpet tiles illustrating color and pattern design for each carpet color selected.
- D. Manufacturer's Installation Instructions: Indicate special procedures and perimeter conditions requiring special attention.
- E. Maintenance Data: Include maintenance procedures, recommended maintenance materials, and suggested schedule for cleaning.
- F. Maintenance Materials: Furnish the following for Owner's use in maintenance of project.
  - 1. See Section 01 60 00 - Product Requirements, for additional provisions.
  - 2. Extra Carpet Tiles: Quantity equal to 10 percent of total installed of each color and pattern installed.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing specified carpet tile with minimum three years experience.
- B. Installer Qualifications: Company specializing in installing carpet tile with minimum three years experience.

**1.05 FIELD CONDITIONS**

- A. Store materials in area of installation for minimum period of 24 hours prior to installation.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Tile Carpeting:
  - 1. Mannington Mills, Inc.; [www.manningtoncommercial.com](http://www.manningtoncommercial.com).
  - 2. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 MATERIALS**

- A. Tile Carpeting, Type CPT1: Patterned Loop, manufactured in one color dye lot.
  - 1. Product: Offline Loop manufactured by Mannington.
  - 2. Color/ Pattern: As indicated in Drawings.
- B. Tile Carpeting, Type CPT3: Textured Patterned Loop, manufactured in one color dye lot.
  - 1. Product: Boucle manufactured by Mannington.
  - 2. Tile Size: 24 by 24 inch, nominal.

3. Color/ Pattern: As indicated in Drawings.
- C. Tile Carpeting, Type CPT2: Textured Patterned Loop, manufactured in one color dye lot.
  1. Product: Force manufactured by Mannington.
  2. Color: To be selected by Architect.

### **2.03 ACCESSORIES**

- A. Edge Strips: Schluter , color as selected by Architect.
- B. Carpet Tile Adhesive: Recommended by carpet tile manufacturer; releasable type.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that subfloor surfaces are smooth and flat within tolerances specified for that type of work and are ready to receive carpet tile.
- B. Verify that subfloor surfaces are dust-free and free of substances that could impair bonding of adhesive materials to subfloor surfaces.
- C. Cementitious Subfloor Surfaces: Verify that substrates are ready for flooring installation by testing for moisture and alkalinity (pH).
  1. Test as Follows:
    - a. Alkalinity (pH): ASTM F710.
    - b. Internal Relative Humidity: ASTM F2170.
    - c. Moisture Vapor Emission: ASTM F1869.
  2. Obtain instructions if test results are not within limits recommended by flooring material manufacturer and adhesive materials manufacturer.
- D. Verify that required floor-mounted utilities are in correct location.

### **3.02 PREPARATION**

- A. Prepare floor substrates as recommended by flooring and adhesive manufacturers.
- B. Remove subfloor ridges and bumps. Fill minor or local low spots, cracks, joints, holes, and other defects with subfloor filler.
- C. Apply, trowel, and float filler to achieve smooth, flat, hard surface. Prohibit traffic until filler is cured.
- D. Vacuum clean substrate.

### **3.03 INSTALLATION**

- A. Starting installation constitutes acceptance of subfloor conditions.
- B. Install carpet tile in accordance with manufacturer's instructions.
- C. Blend carpet from different cartons to ensure minimal variation in color match.
- D. Cut carpet tile clean. Fit carpet tight to intersection with vertical surfaces without gaps.
- E. Lay carpet tile in square pattern, with pile direction parallel to next unit, set parallel to building lines.
- F. Locate change of color or pattern between rooms under door centerline.
- G. Fully adhere carpet tile to substrate.
- H. Trim carpet tile neatly at walls and around interruptions.
- I. Complete installation of edge strips, concealing exposed edges.

### **3.04 CLEANING**

- A. Remove excess adhesive without damage, from floor, base, and wall surfaces.

B. Clean and vacuum carpet surfaces.

**END OF SECTION**



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**SECTION 09 84 30**  
**SOUND-ABSORBING WALL AND CEILING UNITS**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Sound-absorbing panels.

**1.02 REFERENCE STANDARDS**

- A. ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method 2017.
- B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials 2020.
- C. ASTM E795 - Standard Practices for Mounting Test Specimens During Sound Absorption Tests 2016.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed data sheets for products specified.
- C. Shop Drawings: Fabrication and installation details, panel layout, and fabric orientation.
- D. Selection Samples: Manufacturer's color charts for fabric covering, indicating full range of fabrics, colors, and patterns available.
- E. Verification Samples: Fabricated samples of each type of panel specified; 12 by 12 inch, showing construction, edge details, and fabric covering.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company with not less than five years of experience in manufacturing acoustical products similar to those specified.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Protect acoustical units from moisture during shipment, storage, and handling. Deliver in factory-wrapped bundles; do not open bundles until units are needed for installation.
- B. Store units flat, in dry, well-ventilated space; do not stand on end.
- C. Protect edges from damage.

**1.06 MOCK-UP**

- A. See Section 01 40 00 - Quality Requirements, for additional mock-up requirements.
- B. Construct mock-up of acoustical units at location as indicated by Architect.
  - 1. Minimum mock-up dimensions; 48 by 48 inches.
  - 2. Approved mock-up may remain as part of the Work.

**PART 2 PRODUCTS**

**2.01 FABRIC-COVERED SOUND-ABSORBING UNITS**

- A. General:
  - 1. Prefinished, factory assembled fabric-covered panels.
  - 2. Surface Burning Characteristics: Flame spread index of 25 or less and smoke developed index of 450 or less, when tested in accordance with ASTM E84.
- B. Fabric-Covered Acoustical Panels for Walls:
  - 1. Panel Core: Manufacturer's standard rigid or semi-rigid fiberglass core.
    - a. Facing: 1/8 inch impact-resistant and tackable surface laminated to core.
  - 2. Noise Reduction Coefficient (NRC): 1.15 when tested in accordance with ASTM C423 for Type [ ] mounting, per ASTM E795.

3. Panel Size: As indicated on drawings.
4. Panel Thickness: 2 inches.
5. Edges: Perimeter edges reinforced by a formulated resin hardener and fully-wrapped with fabric, including tailored corners.
6. Corners: Square.
7. Fabric: Guilford of Maine "Otto".
8. Color: As selected by Architect from manufacturer's full range.
9. Patterns: Where fabric with directional or repeating patterns or fabric with directional weave is used, mark for installation in same direction.
10. Mounting Method: Back-mounted with mechanical fasteners.

## **2.02 FABRICATION**

- A. Fabric Wrapped, General: Fabricate panels to sizes and configurations as indicated, with fabric facing installed without sagging, wrinkles, blisters, or visible seams.
- B. Tolerances: Fabricate to finished tolerance of plus or minus 1/16 inch for thickness, overall length and width, and squareness from corner to corner.

## **2.03 ACCESSORIES**

- A. Back-Mounting Accessories: Manufacturer's standard accessories for concealed support, designed to allow panel removal, and as follows:
  1. Two-part clip and base-support bracket system; brackets designed to support full weight of panels and clips designed for lateral support, with one part mechanically attached to back of panel and the other attached to substrate.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates for conditions detrimental to installation of acoustical units. Proceed with installation only after unsatisfactory conditions have been corrected.

### **3.02 INSTALLATION**

- A. Install acoustical units in locations as indicated, following manufacturer's installation instructions.
- B. Align panels accurately, with edges plumb and top edges level. Scribe to fit accurately at adjoining work and penetrations.
- C. Install acoustical units to construction tolerances of plus or minus 1/16 inch for the following:
  1. Plumb and level.
  2. Flatness.

### **3.03 CLEANING**

- A. Clean fabric facing upon completion of installation from dust and other foreign materials, following manufacturer's instructions.

### **3.04 PROTECTION**

- A. Provide protection of installed acoustical panels until Date of Substantial Completion.
- B. Replace panels that cannot be cleaned and repaired to satisfaction of the Architect.

**END OF SECTION**

**SECTION 09 91 13  
EXTERIOR PAINTING**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section includes surface preparation and the application of paint systems on exterior substrates.
  - 1. Concrete.
  - 2. Clay masonry.
  - 3. Concrete masonry units (CMU).
  - 4. Steel.
  - 5. Galvanized metal.
  - 6. Aluminum (not anodized or otherwise coated).
  - 7. Stainless-steel flashing.
  - 8. Wood.
  - 9. Plastic trim fabrications.
  - 10. Exterior portland cement plaster (stucco).
  - 11. Exterior gypsum board.
  - 12. [ ]
- B. Related Requirements:
  - 1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.
  - 2. Section 099600 "High-Performance Coatings" for special-use coatings.
  - 3. Section 099123 "Interior Painting" for surface preparation and the application of paint systems on interior substrates.
  - 4. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on exterior wood substrates.

**1.03 DEFINITIONS**

- A. Gloss Level Flat: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level Eggshell: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level Semi-Gloss: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level Gloss: 60 to 70 units at 60 degrees, according to ASTM D 523.

**1.04 ACTION SUBMITTALS**

- A. Product Data: For each type of product. Include preparation requirements and application instructions.
- B. Samples for Initial Selection: For each type of topcoat product.
- C. Samples for Verification: For each type of paint system and each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Step coats on Samples to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.
- D. Product List: For each product indicated, include the following:

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

#### **1.05 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. Paint: One (1) gal. of each material and color applied.

#### **1.06 QUALITY ASSURANCE**

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
    - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
    - b. Other Items: Architect will designate items or areas required.
  2. Final approval of color selections will be based on mockups.
    - a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
  3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
  4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  1. Maintain containers in clean condition, free of foreign materials and residue.
  2. Remove rags and waste from storage areas daily.

#### **1.08 FIELD CONDITIONS**

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints 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.

### **PART 2 PRODUCTS**

#### **2.01 MANUFACTURERS**

- A. Subject to compliance with requirements, provide products by the following:
  1. Benjamin Moore & Co.
  2. Bennette Paint Manufacturing Company, Inc.
  3. Columbia Paint & Coatings.
  4. Dunn-Edwards Corporation.
  5. ICI Paints.
  6. Kelly-Moore Paints.
  7. Kwal Paint.
  8. PPG Architectural Finishes, Inc.
  9. Pratt & Lambert.
  10. Sherwin-Williams Company (The).

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

## **2.02 PAINT, GENERAL**

- A. Provide products that comply with Manufacturers standards indicated and that are equal in VOC and quality.
- B. Material Compatibility:
  - 1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  - 2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Provide materials that comply with VOC limits of authorities having jurisdiction.
- D. Colors: As selected by Architect from manufacturer's full range .
  - 1. 10 percent of surface area will be painted with deep tones.

## **2.03 SOURCE QUALITY CONTROL**

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

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

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

### **3.02 PREPARATION**

- A. Comply with manufacturer's written instructions and recommendations applicable to substrates and paint systems indicated.

- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer.
  - 1. SSPC-SP 2, "Hand Tool Cleaning."
  - 2. SSPC-SP 3, "Power Tool Cleaning."
  - 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
  - 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
  - 1. Scrape and clean knots. Before applying primer, apply coat of knot sealer recommended in writing by topcoat manufacturer for exterior use in paint system indicated.
  - 2. Sand surfaces that will be exposed to view, and dust off.
  - 3. Prime edges, ends, faces, undersides, and backsides of wood.
  - 4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Plastic Trim Fabrication Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

### 3.03 APPLICATION

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

- B. Tint undercoats same color as topcoat but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
  - 1. Paint the following work where exposed to view:
    - a. Equipment, including panelboards.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.
    - g. Tanks that do not have factory-applied final finishes.

### **3.04 FIELD QUALITY CONTROL**

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

### **3.05 CLEANING AND PROTECTION**

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

### **3.06 EXTERIOR PAINTING SCHEDULE**

- A. Exterior Concrete/Masonry Areas (Smooth):
  - 1. Flat Finish
    - a. Primer: Loxon Concrete & Masonry Primer, A24W8300, <100 g/L VOC
    - b. 1st coat: A-100 Exterior Latex Flat, A6 series, <50 g/L VOC
    - c. 2nd coat: A-100 Exterior Latex Flat, A6 series, <50 g/L VOC
  - 2. Satin Finish
    - a. Primer: Loxon Concrete & Masonry Primer, A24W8300, <100 g/L VOC
    - b. 1st coat: A-100 Exterior Latex Satin, A82 series, <50 g/L VOC
    - c. 2nd coat: A-100 Exterior Latex Satin, A82 series, <50 g/L VOC
  - 3. Textured Finish
    - a. Primer: Loxon Concrete & Masonry Primer, A24W8300, <100 g/L VOC



- b. 1st coat: Ultracrete Textured Masonry Topcoat Fine, A44W801, Medium A44W811, Extra Coarse, A44W821,
    - 4. High Build Flat Finish (Waterproofing) - Low VOC System
      - a. Primer: Loxon Exterior Waterproofing System, A24 series, <50 g/L VOC
      - b. 1st coat: Loxon Exterior Waterproofing System, A24 series, <50 g/L VOC
- B. Exterior CMU & Block Areas (Porous):
  - 1. Flat Finish
    - a. Filler: Loxon Block Surfacer, A24W200, <100 g/L VOC
    - b. 1st coat: A-100 Exterior Latex Flat, A6 series, <50 g/L VOC
    - c. 2nd coat: A-100 Exterior Latex Flat, A6 series, <50 g/L VOC
  - 2. Satin Finish
    - a. Filler: Loxon Block Surfacer, A24W200, <100 g/L VOC
    - b. 1st coat: A-100 Exterior Latex Satin, A82 series, <50 g/L VOC
    - c. 2nd coat: A-100 Exterior Latex Satin, A82 series, <50 g/L VOC
  - 3. High Build Flat Finish (Waterproofing) - Low VOC Topcoat
    - a. Filler: Loxon Block Surfacer, A24W200, <100 g/L VOC
    - b. 1st coat: Loxon Exterior Waterproofing System, A24 series, <50 g/L VOC
    - c. 2nd coat: Loxon Exterior Waterproofing System, A24 series, <50 g/L VOC
- C. Exterior Ferrous & Galvanized Metals:
  - 1. Semi-Gloss Finish
    - a. Primer: Pro Industrial Pro-Cryl Universal Metal Primer, B66-310, <100 g/L VOC
    - b. 1st coat: Pro Industrial Acrylic Semi-Gloss, B66-650 series, <50 g/L VOC
    - c. 2nd coat: Pro Industrial Acrylic Semi-Gloss, B66-650 series, <50 g/L VOC
- D. High Performance System - Canopies and Handrails
  - 1. Gloss Finish
    - a. Primer: Pro Industrial Pro-Cryl Universal Metal Primer, B66-310, <100 g/L VOC
    - b. 1st coat: Water-Based Acrolon 100 Polyurethane Gloss, B65-700 series, <100 g/L VOC
    - c. 2nd coat: Water-Based Acrolon 100 Polyurethane Gloss, B65-700 series, <100 g/L VOC
- E. Exterior Wood:
  - 1. Satin Finish
    - a. Primer: Exterior Latex Wood Primer, B42W8041, <100 g/L VOC
    - b. 1st coat: A-100 Exterior Latex Satin, A82 series, <50 g/L VOC
    - c. 2nd coat: A-100 Exterior Latex Satin, A82 series, <50 g/L VOC
- F. Exterior Plaster/Stucco/EIFS:
  - 1. Flat Finish
    - a. Primer: Loxon Concrete & Masonry Primer, A24W8300, <100 g/L VOC
    - b. 1st coat: A-100 Exterior Latex Flat, A6 series, <50 g/L VOC
    - c. 2nd coat: A-100 Exterior Latex Flat, A6 series, <50 g/L VOC
  - 2. Satin Finish
    - a. Primer: Loxon Concrete & Masonry Primer, A24W8300 series, <100 g/L VOC
    - b. 1st coat: A-100 Exterior Latex Satin, A82 series, <50 g/L VOC
    - c. 2nd coat: A-100 Exterior Latex Satin, A82 series, <50 g/L VOC
  - 3. High Build Flat Finish (Waterproofing) - Low VOC System
    - a. Primer: Loxon Exterior Waterproofing System, A24 series, <50 g/L VOC
    - b. 1st coat: Loxon Exterior Waterproofing System, A24 series, <50 g/L VOC

**END OF SECTION**

**SECTION 09 91 23  
INTERIOR PAINTING**

**PART 1 GENERAL**

**1.01 RELATED DOCUMENTS**

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

**1.02 SUMMARY**

- A. Section includes surface preparation and the application of paint systems on interior substrates.
  - 1. Concrete.
  - 2. Clay masonry.
  - 3. Concrete masonry units (CMU).
  - 4. Steel.
  - 5. Cast iron.
  - 6. Galvanized metal.
  - 7. Aluminum (not anodized or otherwise coated).
  - 8. Wood.
  - 9. Gypsum board.
  - 10. Plaster.
  - 11. Spray-textured ceilings.
  - 12. Cotton or canvas insulation covering.
  - 13. ASJ insulation covering.
- B. Related Requirements:
  - 1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates with primers specified in this Section.
  - 2. Section 099600 "High-Performance Coatings" for high-performance and special-use coatings.
  - 3. Section 099113 "Exterior Painting" for surface preparation and the application of paint systems on exterior substrates.
  - 4. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.

**1.03 DEFINITIONS**

- A. Gloss Level Flat: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
- B. Gloss Level Eggshell: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
- C. Gloss Level Semi-Gloss: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
- D. Gloss Level Gloss: 60 to 70 units at 60 degrees, according to ASTM D 523.

**1.04 ACTION SUBMITTALS**

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

- C. Samples for Initial Selection: For each type of topcoat product.
- D. Samples for Verification: For each type of paint system and in each color and gloss of topcoat.
  - 1. Submit Samples on rigid backing, 8 inches square.
  - 2. Step coats on Samples to show each coat required for system.
  - 3. Label each coat of each Sample.
  - 4. Label each Sample for location and application area.
- E. Product List: For each product indicated, include the following:
  - 1. Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules.
  - 2. VOC content.

### **1.05 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. Paint: One (1) gal. of each material and color applied.

### **1.06 QUALITY ASSURANCE**

- A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
  - 1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
    - a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft..
    - b. Other Items: Architect will designate items or areas required.
    - c. Final approval of color selections will be based on mockups.
      - 1) If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.
    - d. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
    - e. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F.
  - 1. Maintain containers in clean condition, free of foreign materials and residue.
  - 2. Remove rags and waste from storage areas daily.

### **1.08 FIELD CONDITIONS**

- A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F.
- B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures less than 5 deg F above the dew point; or to damp or wet surfaces.

## **PART 2 PRODUCTS**

### **2.01 MANUFACTURERS**

- A. Subject to compliance with requirements, provide products by the following:
  - 1. Benjamin Moore & Co.
  - 2. Bennette Paint Manufacturing Company, Inc.
  - 3. Columbia Paint & Coatings.
  - 4. Dunn-Edwards Corporation.
  - 5. ICI Paints.

6. Kelly-Moore Paints.
  7. Kwal Paint.
  8. PPG Architectural Finishes, Inc.
  9. Pratt & Lambert.
  10. Sherwin-Williams Company (The).
- B. Products: Subject to compliance with requirements, provide product listed in other Part 2 articles for the paint category indicated.

## **2.02 PAINT, GENERAL**

- A. Provide products that comply with Manufacturers standards indicated and that are equal in VOC and quality.
- B. Material Compatibility:
1. Provide materials for use within each paint system that are compatible with one another and substrates indicated, under conditions of service and application as demonstrated by manufacturer, based on testing and field experience.
  2. For each coat in a paint system, provide products recommended in writing by manufacturers of topcoat for use in paint system and on substrate indicated.
- C. VOC Content: Products shall comply with VOC limits of authorities having jurisdiction.
1. Flat Paints and Coatings: 50 g/L.
  2. Nonflat Paints and Coatings: 150 g/L.
  3. Dry-Fog Coatings: 400 g/L.
  4. Primers, Sealers, and Undercoaters: 200 g/L.
  5. Anticorrosive and Antirust Paints Applied to Ferrous Metals: 250 g/L.
  6. Zinc-Rich Industrial Maintenance Primers: 340 g/L.
  7. Pretreatment Wash Primers: 420 g/L.
  8. Floor Coatings: 100 g/L.
  9. Shellacs, Clear: 730 g/L.
  10. Shellacs, Pigmented: 550 g/L.
- D. Low-Emitting Materials: Interior paints and coatings shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
- E. Colors: As selected by Architect from manufacturer's full range .
1. 10 percent of surface area will be painted with deep tones.

## **2.03 SOURCE QUALITY CONTROL**

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

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

- B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
  - 1. Concrete: 12 percent.
  - 2. Masonry (Clay and CMU): 12 percent.
  - 3. Wood: 15 percent.
  - 4. Gypsum Board: 12 percent.
  - 5. Plaster: 12 percent.
- C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.
- D. Plaster Substrates: Verify that plaster is fully cured.
- E. Spray-Textured Ceiling Substrates: Verify that surfaces are dry.
- F. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
- G. Proceed with coating application only after unsatisfactory conditions have been corrected.
  - 1. Application of coating indicates acceptance of surfaces and conditions.

### 3.02 PREPARATION

- A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates indicated.
- B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.
  - 1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.
- C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.
  - 1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.
- D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.
- E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceed that permitted in manufacturer's written instructions.
- F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer.
  - 1. SSPC-SP 2, "Hand Tool Cleaning."
  - 2. SSPC-SP 3, "Power Tool Cleaning."
  - 3. SSPC-SP 7/NACE No. 4, "Brush-off Blast Cleaning."
  - 4. SSPC-SP 11, "Power Tool Cleaning to Bare Metal."
- G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.
- H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal fabricated from coil stock by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.
- I. Aluminum Substrates: Remove loose surface oxidation.
- J. Wood Substrates:
  - 1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
  - 2. Sand surfaces that will be exposed to view, and dust off.

3. Prime edges, ends, faces, undersides, and backsides of wood.
  4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.
- K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

### 3.03 APPLICATION

- A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
1. Use applicators and techniques suited for paint and substrate indicated.
  2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
  3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
  4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
  5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.
- B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.
- C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.
- D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.
- E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:
1. Paint the following work where exposed in equipment rooms:
    - a. Equipment, including panelboards.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.
    - g. Tanks that do not have factory-applied final finishes.
    - h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
  2. Paint the following work where exposed in occupied spaces:
    - a. Equipment, including panelboards.
    - b. Uninsulated metal piping.
    - c. Uninsulated plastic piping.
    - d. Pipe hangers and supports.
    - e. Metal conduit.
    - f. Plastic conduit.
    - g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    - h. Other items as directed by Architect.
  3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

### 3.04 FIELD QUALITY CONTROL

- A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.
  - 1. Contractor shall touch up and restore painted surfaces damaged by testing.
  - 2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

### 3.05 CLEANING AND PROTECTION

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

### 3.06 INTERIOR PAINTING SCHEDULE

- A. Masonry and Concrete
  - 1. Eg-Shel Finish - Low Odor Zero VOC Topcoat
    - a. Primer: Loxon Concrete & Masonry Primer, A24W8300, <100 g/L VOC
    - b. 1st coat: ProMar 200 Zero VOC Eg-Shel B26-2600 series, 0 g/L VOC
    - c. 2nd coat: ProMar 200 Zero VOC Eg-Shel B26-2600 series, 0 g/L VOC
  - 2. Semi-Gloss Finish - Low Odor Zero VOC Topcoat
    - a. Primer: Loxon Concrete & Masonry Primer, A24W8300, <100 g/L VOC
    - b. 1st coat: ProMar 200 Zero VOC Semi-Gloss B31-2600 series, 0 g/L VOC
    - c. 2nd coat: ProMar 200 Zero VOC Semi-Gloss B31-2600 series, 0 g/L VOC

#### ***Alternate - Water-Based Epoxy High Performance System***

- 3. Eg-Shel Finish - Water-Based Epoxy System
  - a. Primer: Loxon Concrete & Masonry Primer, A24W8300, <100 g/L VOC
  - b. 1st coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Eg-Shel, K45 series, <150 g/L VOC
  - c. 2nd coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Eg-Shel, K45 series, <150 g/L VOC
- 4. Semi-Gloss Finish - Water-Based Epoxy System
  - a. Primer: Loxon Concrete & Masonry Primer, A24W8300, <100 g/L VOC
  - b. 1st coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 series, <150 g/L VOC
  - c. 2nd coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 series, <150 g/L VOC
- B. CMU - Concrete Masonry Units
  - 1. Eg-Shel Finish - Low Odor Zero VOC Topcoat
    - a. Primer: PrepRite Block Filler, B25W25, <50 g/L VOC
    - b. 1st coat: ProMar 200 Zero VOC Eg-Shel B26-2600 series, 0 g/L VOC
    - c. 2nd coat: ProMar 200 Zero VOC Eg-Shel B26-2600 series, 0 g/L VOC
  - 2. Semi-Gloss Finish - Low Odor Zero VOC Topcoat
    - a. Primer: PrepRite Block Filler, B25W25, <50 g/L VOC

- b. 1st coat: ProMar 200 Zero VOC Semi-Gloss B31-2600 series, 0 g/L VOC
- c. 2nd coat: ProMar 200 Zero VOC Semi-Gloss B31-2600 series, 0 g/L VOC

**Alternate - Water-Based Epoxy High Performance System**

- 3. Eg-Shel Finish - Water-Based Epoxy System
  - a. Primer: Loxon Block Surfacer, A24W200, <100 g/L VOC
  - b. 1st coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Eg-Shel, K45 series, <150 g/L VOC
  - c. 2nd coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Eg-Shel, K45 series, <150 g/L VOC
- 4. Semi-Gloss Finish - Water-Based Epoxy System
  - a. Primer: Loxon Block Surfacer, A24W200, <100 g/L VOC
  - b. 1st coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 series, <150 g/L VOC
  - c. 2nd coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 series, <150 g/L VOC
- C. Gypsum Board
  - 1. Flat Finish - Low Odor Zero VOC System
    - a. Primer: ProMar 200 Zero VOC Interior Latex Primer, B28W2600, 0 g/L VOC
    - b. 1st coat: ProMar 200 Zero VOC Flat, B30-2600 series, 0 g/L VOC
    - c. 2nd coat: ProMar 200 Zero VOC Flat, B30-2600 series, 0 g/L VOC
  - 2. Eg-Shel Finish - Low Odor Zero VOC System
    - a. Primer: ProMar 200 Zero VOC Interior Latex Primer, B28W2600 0 g/L VOC
    - b. 1st coat: ProMar 200 Zero VOC Eg-Shel B26-2600 series, 0 g/L VOC
    - c. 2nd coat: ProMar 200 Zero VOC Eg-Shel B26-2600 series, 0 g/L VOC
  - 3. Semi-Gloss Finish - Low Odor Zero VOC System
    - a. Primer: ProMar 200 Zero VOC Interior Latex Primer, B28W2600, 0 g/L VOC
    - b. 1st coat: ProMar 200 Zero VOC Semi-Gloss B31-2600 series, 0 g/L VOC
    - c. 2nd coat: ProMar 200 Zero VOC Semi-Gloss B31-2600 series, 0 g/L VOC

**Alternate (Water-Based Epoxy)**

- 4. Eg-Shel Finish
  - a. Primer: ProMar 200 Zero VOC Primer, B28W2600, 0 g/L VOC
  - b. 1st coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Eg-Shel, K45 series, <150 g/L VOC
  - c. 2nd coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Eg-Shel, K45 series, <150 g/L VOC
- 5. Semi-Gloss Finish
  - a. Primer: ProMar 200 Zero VOC Primer, B28W2600, 0 g/L VOC
  - b. 1st coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 series, <150 g/L VOC
  - c. 2nd coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 series, <150 g/L VOC
- 6. Gloss Finish
  - a. Primer: ProMar 200 Zero VOC Primer, B28W2600, 0 g/L VOC
  - b. 1st coat: Pro Industrial Water-Based Epoxy Gloss, B73-300 series, <50 g/L VOC
  - c. 2nd coat: Pro Industrial Water-Based Epoxy Gloss, B73-300 series, <50 g/L VOC
- D. Wood
  - 1. Wood - Painted Doors, Frames, Trim and Chair Rails
    - a. Semi-Gloss Finish



- 1) Primer: ProMar 200 Zero VOC Primer, B28W2600, 0 g/L VOC
- 2) 1st coat: Pro Industrial Acrylic Semi-Gloss, B66-650 series, <50 g/L VOC
- 3) 2nd coat: Pro Industrial Acrylic Semi-Gloss, B66-650 series, <50 g/L VOC
- 2. Wood - Stained Doors, Frames, Trim and Chair Rails
  - a. Stained Finish
    - 1) Stain: Wood Classics 250 g/l Stain, A49W800 series, 250 g/L VOC
    - 2) 2nd coat: Wood Classics WB Polyurethane A68, <350 g/L VOC
    - 3) 3rd coat: Wood Classics WB Polyurethane A68, <350 g/L VOC
- E. Non-Ferrous Metal & Ferrous Metal
  - 1. Non-Ferrous Metal & Ferrous Metal - Doors, Frames and Miscellaneous Metals
    - a. Semi-Gloss Finish
      - 1) Primer: Pro Industrial Pro-Cryl Universal Primer, B66-310 series, <100 g/L VOC
      - 2) 1st coat: Pro Industrial Acrylic Semi-Gloss, B66-650 series, <50 g/L VOC
      - 3) 2nd coat: Pro Industrial Acrylic Semi-Gloss, B66-650 series, <50 g/L VOC
    - Alternate - High Performance System for Handrails***
    - b. Semi-Gloss Finish
      - 1) Primer: Pro Industrial Pro-Cryl Universal Primer, B66-310 series, <100 g/L VOC
      - 2) 1st coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 series, <150 g/L VOC
      - 3) 2nd coat: Pro Industrial Pre-Catalyzed Water-Based Epoxy Semi-Gloss, K46 series, <150 g/L VOC
  - F. Galvanized Metal Decking & Ferrous Decking - Including Bar Joists
    - 1. Flat, Eg-Shel, or Semi-Gloss Finish
      - a. Primer: Pro Industrial Pro-Cryl Universal Primer, B66-310 series, <100 g/L VOC
      - b. 1st coat: Low VOC Waterborne Acrylic Dryfall, Flat B42W81, Eg-Shel B42W82, Semi-Gloss, B42W83,
        - 1) All sheens <50 g/L VOC
      - c. 2nd coat: Low VOC Waterborne Acrylic Dryfall, Flat B42W81, Eg-Shel B42W82, Semi-Gloss, B42W83, All sheens <50 g/L VOC

**END OF SECTION**

**SECTION 10 14 00  
SIGNAGE**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Room and door signs.
- B. Building identification signs.
- C. Plaque.

**1.02 REFERENCE STANDARDS**

- A. 36 CFR 1191 - Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities; Architectural Barriers Act (ABA) Accessibility Guidelines current edition.
- B. ADA Standards - Americans with Disabilities Act (ADA) Standards for Accessible Design 2010.
- C. ICC A117.1 - Accessible and Usable Buildings and Facilities 2017.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's printed product literature for each type of sign, indicating sign styles, font, foreground and background colors, locations, overall dimensions of each sign.
- C. Signage Schedule: Provide information sufficient to completely define each sign for fabrication, including room number, room name, other text to be applied, sign and letter sizes, fonts, and colors.
  - 1. When room numbers to appear on signs differ from those on drawings, include the drawing room number on schedule.
  - 2. When content of signs is indicated to be determined later, request such information from Owner through Architect at least 2 months prior to start of fabrication; upon request, submit preliminary schedule.
  - 3. Submit for approval by Owner through Architect prior to fabrication.
- D. Samples: Submit one sample of each type of sign, of size similar to that required for project, illustrating sign style, font, and method of attachment.
- E. Selection Samples: Where colors are not specified, submit two sets of color selection charts or chips.
- F. Verification Samples: Submit samples showing colors specified.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Package signs as required to prevent damage before installation.
- B. Package room and door signs in sequential order of installation, labeled by floor or building.
- C. Store tape adhesive at normal room temperature.

**1.06 FIELD CONDITIONS**

- A. Do not install tape adhesive when ambient temperature is lower than recommended by manufacturer.
- B. Maintain this minimum temperature during and after installation of signs.

## **PART 2 PRODUCTS**

### **2.01 SIGNAGE APPLICATIONS**

- A. Accessibility Compliance: Signs are required to comply with ADA Standards and ICC A117.1, unless otherwise indicated; in the event of conflicting requirements, comply with the most comprehensive and specific requirements.
- B. Room and Door Signs: Provide a sign for doorways as scheduled on the drawings.
  - 1. Sign Type: Flat signs with engraved panel media as specified.
  - 2. Provide "tactile" signage, with letters raised minimum 1/32 inch and Grade II braille.
  - 3. Character Height: 1 inch.
  - 4. Sign Height: 2 inches, unless otherwise indicated.
  - 5. Office Doors: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section for replaceable occupant name.
  - 6. Conference and Meeting Rooms: Identify with room numbers to be determined later, not the numbers indicated on drawings; in addition, provide "window" section with sliding "In Use/Vacant" indicator.
  - 7. Service Rooms: Identify with room names and numbers to be determined later, not those indicated on drawings.
  - 8. Rest Rooms: Identify with pictograms, the names "MEN" and "WOMEN", and braille.
- C. Building Identification Signs:
  - 1. Use individual cast aluminum letters.
  - 2. Mount on outside wall in location indicated on drawings.
- D. Plaque: See drawings for details.

### **2.02 SIGN TYPES**

- A. Flat Signs: Signage media without frame.
  - 1. Edges: Square.
  - 2. Corners: Square.
  - 3. Wall Mounting of One-Sided Signs: Tape adhesive.
- B. Color and Font: Unless otherwise indicated:
  - 1. Character Font: Helvetica, Arial, or other sans serif font.
  - 2. Character Case: Upper case only.
  - 3. Background Color: Clear.
  - 4. Character Color: Contrasting color.

### **2.03 TACTILE SIGNAGE MEDIA**

- A. Engraved Panels: Laminated colored plastic; engraved through face to expose core as background color:
  - 1. Total Thickness: 1/16 inch.

### **2.04 PLAQUES**

- A. Metal Plaques:
  - 1. Metal: Aluminum casting.
  - 2. Metal Thickness: 1/8 inch, minimum.
  - 3. Size: As indicated on drawings.
  - 4. Text and Typeface:
    - a. Character Font: Helvetica, Arial, or other sans serif font.
    - b. Character Case: Upper case only.
    - c. Character Color: Contrast with background color.
  - 5. Border Style: As indicated on drawings.
  - 6. Background Texture: Pebble.

7. Surface Finish: Brushed, satin.

## **2.05 DIMENSIONAL LETTERS**

- A. Metal Letters:
  1. Metal: Aluminum casting.
  2. Metal Thickness: Manufacturer's standard for letter size.
  3. Letter Height: As indicated on drawings.
  4. Text and Typeface: As indicated on drawings
  5. Finish: Brushed, satin.
  6. Mounting: Studs / anchors on backs of letters.

## **2.06 ACCESSORIES**

- A. Concealed Screws: Stainless steel, galvanized steel, chrome plated, or other non-corroding metal.
- B. Exposed Screws: Chrome plated.
- C. Tape Adhesive: Double sided tape, permanent adhesive.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that substrate surfaces are ready to receive work.

### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install neatly, with horizontal edges level.
- C. Protect from damage until Date of Substantial Completion; repair or replace damaged items.

**END OF SECTION**

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**SECTION 10 26 00  
WALL AND DOOR PROTECTION**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Corner guards.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 10 00 - Rough Carpentry: Blocking for wall and corner guard anchors.

**1.03 REFERENCE STANDARDS**

- A. ASTM D256 - Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics 2010 (Reapproved 2018).
- B. ASTM F476 - Standard Test Methods for Security of Swinging Door Assemblies 2014.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Indicate physical dimensions, features, wall mounting brackets with mounted measurements, anchorage details, and rough-in measurements.
- C. Shop Drawings: Include plans, elevation, sections, and attachment details. Show design and spacing of supports for protective corridor handrails, required to withstand structural loads.
- D. Samples: Submit samples illustrating component design, configurations, joinery, color and finish.
  - 1. Submit two sections of corner guards, 24 inches long.
- E. Manufacturer's Instructions: Indicate special procedures, perimeter conditions requiring special attention.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver wall and door protection items in original, undamaged protective packaging. Label items to designate installation locations.

**PART 2 PRODUCTS**

**2.01 PERFORMANCE CRITERIA**

- A. Impact Strength: Unless otherwise noted, provide protection products and assemblies that have been successfully tested for compliance with applicable provisions of ASTM D256 and/or ASTM F476.

**2.02 PRODUCT TYPES**

- A. Corner Guards - Surface Mounted:
  - 1. Material: Type 304 stainless steel, No. 4 finish, 16 gauge, 0.0625 inch thick.
  - 2. Width of Wings: 2 inches.
  - 3. Corner: Square.
  - 4. Length: One piece.
- B. See Section 06 10 00 for wood blocking for wall and corner guard anchors.

**2.03 FABRICATION**

- A. Fabricate components with tight joints, corners and seams.

**PART 3 EXECUTION**

**3.01 EXAMINATION**

- A. Verify that rough openings, concealed blocking, and anchors are correctly sized and located.

### **3.02 INSTALLATION**

- A. Install components in accordance with manufacturer's instructions, level and plumb, secured rigidly in position to supporting construction.
- B. Position corner guard 4 inches above finished floor to 86 inches high.

**END OF SECTION**

**SECTION 10 28 00  
TOILET, BATH, AND LAUNDRY ACCESSORIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Commercial toilet accessories.
- B. Commercial shower and bath accessories.
- C. Utility room accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 10 00 - Rough Carpentry: Concealed supports for accessories, including in wall framing and plates.

**1.03 REFERENCE STANDARDS**

- A. ASTM A269/A269M - Standard Specification for Seamless and Welded Austenitic Stainless Steel Tubing for General Service 2015a (Reapproved 2019).
- B. ASTM A653/A653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process 2020.
- C. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- D. ASTM C1036 - Standard Specification for Flat Glass 2016.
- E. ASTM C1503 - Standard Specification for Silvered Flat Glass Mirror 2018.

**1.04 ADMINISTRATIVE REQUIREMENTS**

- A. Coordinate the work with the placement of internal wall reinforcement to receive anchor attachments.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Submit data on accessories describing size, finish, details of function, and attachment methods.
- C. Manufacturer's Installation Instructions: Indicate special procedures and conditions requiring special attention.

**PART 2 PRODUCTS**

**2.01 MATERIALS**

- A. Accessories - General: Shop assembled, free of dents and scratches and packaged complete with anchors and fittings, steel anchor plates, adapters, and anchor components for installation.
  - 1. Grind welded joints smooth.
  - 2. Fabricate units made of metal sheet of seamless sheets with flat surfaces.
- B. Stainless Steel Sheet: ASTM A666, Type 304.
- C. Stainless Steel Tubing: ASTM A269/A269M, Grade TP304 or TP316.
- D. Galvanized Sheet Steel: Hot-dipped galvanized steel sheet, ASTM A653/A653M, with G90/Z275 coating.
- E. Mirror Glass: Annealed float glass, ASTM C1036 Type I, Class 1, Quality Q2, with silvering, protective and physical characteristics complying with ASTM C1503.
- F. Adhesive: Contact type, waterproof.

**2.02 FINISHES**

- A. Stainless Steel: Satin finish, unless otherwise noted.



## **2.03 COMMERCIAL TOILET ACCESSORIES**

- A. [TA-1] Toilet Paper Dispenser: Owner provided and installed by others
- B. [TA-6] Paper Towel Dispenser: Owner provided and installed by others,
- C. Waste Receptacle: Owner provided and installed by others.
- D. [TA-2] Soap Dispenser: Owner provided and installed by others
- E. [TA-3] Mirrors: Stainless steel framed, 1/4 inch thick annealed float glass; ASTM C1036.
  - 1. Annealed Float Glass: Silvering, protective and physical characteristics in compliance with ASTM C1503.
  - 2. Size: As indicated on drawings.
  - 3. Frame: 0.05 inch angle shapes, with mitered and welded and ground corners; satin finish.
  - 4. Backing: Full-mirror sized, minimum 0.03 inch galvanized steel sheet and nonabsorptive filler material.
- F. [TA-5] Grab Bars: Stainless steel, peened surface.
  - 1. Standard Duty Grab Bars:
    - a. Push/Pull Point Load: 250 pound-force, minimum.
    - b. Dimensions: 1-1/4 inch outside diameter, minimum 0.05 inch wall thickness, exposed flange mounting, 1-1/2 inch clearance between wall and inside of grab bar.
    - c. Finish: Satin.
    - d. Length and Configuration: As indicated on drawings.

## **2.04 COMMERCIAL SHOWER AND BATH ACCESSORIES**

- A. Robe Hook: Heavy-duty stainless steel, double-prong, rectangular-shaped bracket and backplate for concealed attachment, satin finish.

## **2.05 UTILITY ROOM ACCESSORIES**

- A. Combination Utility Shelf/Mop and Broom Holder: 0.05 inch thick stainless steel, Type 304, with 1/2 inch returned edges, 0.06 inch steel wall brackets.
  - 1. Hooks: Two, 0.06 inch stainless steel rag hooks at shelf front.
  - 2. Mop/broom holders: Three spring-loaded rubber cam holders at shelf front.
  - 3. Length: 36 inches.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify existing conditions before starting work.
- B. Verify exact location of accessories for installation.
- C. See Section 06 10 00 - Rough Carpentry for installation of blocking, reinforcing plates, and concealed anchors in walls and ceilings.

### **3.02 PREPARATION**

- A. Provide templates and rough-in measurements as required.

### **3.03 INSTALLATION**

- A. Install accessories in accordance with manufacturers' instructions in locations indicated on drawings.
- B. Install plumb and level, securely and rigidly anchored to substrate.
- C. Mounting Heights: As required by accessibility regulations, unless otherwise indicated.
  - 1. Grab Bars: As indicated on drawings.
  - 2. Mirrors: 40 inch, measured from floor to bottom of mirrored surface.

**3.04 PROTECTION**

- A. Protect installed accessories from damage due to subsequent construction operations.

**END OF SECTION**

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**SECTION 10 28 19  
TUB AND SHOWER ENCLOSURES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Frameless tub and shower doors; enclosures.

**1.02 REFERENCE STANDARDS**

- A. 16 CFR 1201 - Safety Standard for Architectural Glazing Materials Current Edition.
- B. ANSI Z97.1 - American National Standard for Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test 2015.
- C. ASTM A480/A480M - Standard Specification for General Requirements for Flat-Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip 2020a.
- D. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar 2015.
- E. ASTM C1036 - Standard Specification for Flat Glass 2016.
- F. ASTM C1048 - Standard Specification for Heat-Strengthened and Fully Tempered Flat Glass 2018.

**1.03 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's literature for enclosure.
- C. Shop Drawings: Indicate layout, dimensions, identification of components, and interface with adjacent construction.

**1.04 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with at least three years of experience.
- B. Installer Qualifications: Company specializing in performing work of type specified and with at least three years of experience.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Store products in manufacturer's unopened packaging until installation.

**1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a one year period after Date of Substantial Completion.

**PART 2 PRODUCTS**

**2.01 FRAMELESS TUB AND SHOWER ENCLOSURES**

- A. Description: Fixed and operable glass panels not individually framed in metal extrusions. Metal components in the enclosure may include header or bottom channel or clips on any stationary panels, hinges, and handle.
- B. Configuration: Frameless shower enclosure with frameless swinging single door and inline panel.
- C. Head Condition: No header with exposed top glass edge.
- D. Frameless Glass Doors:
  - 1. Door Glass Thickness: As determined by manufacturer based on panel size., tempered.
  - 2. Sill Condition: Vinyl sill.
  - 3. Swinging Doors:
    - a. Hinges: Wall-mounted patch hinges; self-closing; swing out.

## **2.02 MATERIALS**

- A. Tempered Glass: Annealed clear flat glass meeting requirements of ASTM C1036, Type I, Quality Q3, fully tempered in accordance with ASTM C1048, Kind FT, and as follows:
  - 1. Comply with 16 CFR 1201, Category 2 and ANSI Z97.1.
  - 2. Thickness: As indicated in enclosure and door types above.
  - 3. Prepare glazing panels for indicated fittings and hardware before tempering.
  - 4. Temper glass materials horizontally; visible tong marks or tong mark distortions are not permitted.
- B. Stainless Steel Components: Complying with ASTM A666, Type 304 alloy.
  - 1. Stainless Steel Finish: No. 4 Bright Polished finish, in accordance with ASTM A480/A480M.
- C. Glazing Seals: Provide manufacturer's standard clear polycarbonate seal at jambs and door bottom for water-tight seal between glass and surrounding frame or construction.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Do not begin installation until supports and adjacent substrates are complete.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### **3.02 INSTALLATION**

- A. Install in accordance with tub and shower enclosure manufacturer's instructions and approved shop drawings..
- B. Fit and align tub and shower enclosure level and plumb.

### **3.03 ADJUSTING**

- A. Adjust tub and shower enclosure doors to operate smoothly.

### **3.04 CLEANING**

### **3.05 PROTECTION**

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

**END OF SECTION**

**SECTION 10 44 00  
FIRE PROTECTION SPECIALTIES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Fire extinguishers.
- B. Fire extinguisher cabinets.
- C. Hose hoist trolley and pulley components.
- D. Accessories.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 10 00 - Rough Carpentry: Wood blocking product and execution requirements.

**1.03 REFERENCE STANDARDS**

- A. NFPA 10 - Standard for Portable Fire Extinguishers 2017, with Errata (2018).

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide extinguisher operational features.
- C. Shop Drawings: Indicate cabinet physical dimensions and rough-in measurements for recessed cabinets.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Fire Extinguishers:
  - 1. Activar Construction Products Group, Inc. - JL Industries; Cosmic Extinguisher - Multipurpose Chemical: [www.activarcpg.com/#sle](http://www.activarcpg.com/#sle).
  - 2. Ansul, a Tyco Business: [www.ansul.com/#sle](http://www.ansul.com/#sle).
  - 3. Kidde, a unit of United Technologies Corp: [www.kidde.com/#sle](http://www.kidde.com/#sle).
  - 4. Potter-Roemer: [www.potterroemer.com/#sle](http://www.potterroemer.com/#sle).
- B. Fire Extinguisher Cabinets and Accessories:
  - 1. Activar Construction Products Group, Inc. - JL Industries: [www.activarcpg.com/#sle](http://www.activarcpg.com/#sle).
  - 2. Kidde, a unit of United Technologies Corp: [www.kidde.com/#sle](http://www.kidde.com/#sle).
  - 3. Larsen's Manufacturing Co: [www.larsensmfg.com/#sle](http://www.larsensmfg.com/#sle).
  - 4. Potter-Roemer: [www.potterroemer.com/#sle](http://www.potterroemer.com/#sle).

**2.02 FIRE EXTINGUISHERS**

- A. Fire Extinguishers - General: Comply with product requirements of NFPA 10 and applicable codes, whichever is more stringent.
- B. Multipurpose Dry Chemical Type Fire Extinguishers: Carbon steel tank, with pressure gauge.
  - 1. Class: A:B:C type.
  - 2. Size: 10 pound.
  - 3. Finish: Baked polyester powder coat, Red color.
  - 4. Temperature range: Minus 40 degrees F to 120 (min) degrees F.

**2.03 FIRE EXTINGUISHER CABINETS**

- A. Cabinet Construction: Non-fire rated.
  - 1. Formed primed steel sheet; 0.036 inch thick base metal.
- B. Cabinet Configuration: Semi-recessed type.
  - 1. Size to accommodate accessories.
  - 2. Trim: Flat rolled edge, with 2 (nominal) inch wide face.

- C. Door: 0.036 (min) inch metal thickness, reinforced for flatness and rigidity with roller type catch. Hinge doors for 180 degree opening with continuous piano hinge.
- D. Door Glazing: Float glass, clear, 1/8 inch thick, and set in resilient channel glazing gasket.
- E. Finish of Cabinet Exterior Trim and Door: Baked enamel, color as selected.
- F. Finish of Cabinet Interior: White colored enamel.

#### **2.04 HOSE HOIST TROLLEY AND PULLEY COMPONENTS**

- A. Refer to Drawings for detail and component identification.

#### **2.05 ACCESSORIES**

- A. Lettering: "FIRE EXTINGUISHER" decal, or vinyl self-adhering, pre-spaced black lettering in accordance with authorities having jurisdiction (AHJ).

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify rough openings for cabinet are correctly sized and located.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Install cabinets plumb and level in wall openings, 27 inches from finished floor to inside bottom of cabinet.
- C. Secure rigidly in place.
- D. Place extinguishers in cabinets.

**END OF SECTION**

**SECTION 10 75 00  
FLAGPOLES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Aluminum Flagpoles.

**1.02 RELATED REQUIREMENTS**

- A. Section 03 30 00 - Cast-in-Place Concrete: Concrete base and foundation construction.

**1.03 REFERENCE STANDARDS**

- A. AASHTO M 36 - Standard Specification for Corrugated Steel Pipe, Metallic-Coated, for Sewers and Drains 2016.
- B. ASTM A123/A123M - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products 2017.
- C. ASTM B241/B241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube 2016.
- D. NAAMM FP 1001 - Guide Specifications for Design Loads of Metal Flagpoles 2007.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide data on pole, accessories, and configurations.
- C. Shop Drawings: Indicate detailed dimensions, base details, anchor requirements, and imposed loads.

**1.05 DELIVERY, STORAGE, AND HANDLING**

- A. Spiral wrap flagpole with protective covering and pack in protective shipping tubes or containers.
- B. Protect flagpole and accessories from damage or moisture.

**PART 2 PRODUCTS**

**2.01 MANUFACTURERS**

- A. Flagpoles:
  - 1. American Flagpole: [www.americanflagpole.com/#sle](http://www.americanflagpole.com/#sle).
  - 2. Concord Industries, Inc: [www.concordindustries.com/#sle](http://www.concordindustries.com/#sle).
  - 3. Substitutions: See Section 01 60 00 - Product Requirements.

**2.02 FLAGPOLES**

- A. Flagpoles: Designed in accordance with NAAMM FP 1001
  - 1. Material: Aluminum.
  - 2. Design: Straight shaft.
  - 3. Mounting: Ground mounted type.
  - 4. Outside Butt Diameter: 5 inches.
  - 5. Nominal Wall Thickness: 3/16 min inches.
  - 6. Nominal Height: 25 ft; measured from nominal ground elevation.
  - 7. Halyard: Interior type .

**2.03 POLE MATERIALS**

- A. Aluminum: ASTM B241/B241M , 6063 alloy , T6 temper.

**2.04 ACCESSORIES**

- A. Finial Ball: Aluminum, 6 inch diameter.
- B. Truck Assembly: Cast aluminum; revolving, stainless steel ball bearings, non-fouling.



- C. Flags:
  - 1. Flag: United States design, 5 ft by 8 ft size, polyester fabric, brass grommets, hemmed edges.
  - 2. Flag: Colorado design, 5 ft by 8 ft size, polyester fabric, brass grommets, hemmed edges.
- D. Cleat Box: Aluminum, with built-in hinge and hasp assembly, attached to pole with tamper proof screws inside box.
  - 1. Provide locking cover for cleat box, with keys.
  - 2. Intent is for cable functions to be securable with a key to prevent unauthorized flag raising or lowering.
- E. Halyard: 5/16 inch diameter stainless steel aircraft cable with 4 stainless steel snap hooks.
  - 1. Four (4) stainless steel snap hooks to permit flying two (2) flags at the same time, one over the other.

## **2.05 OPERATORS**

- A. Hand Crank: Removable type.

## **2.06 MOUNTING COMPONENTS**

- A. Foundation Tube Sleeve: AASHTO M 36, corrugated 16 gauge, 0.0598 inch steel, galvanized, depth of as required for wind loading inches.

## **2.07 FINISHING**

- A. Metal Surfaces in Contact With Concrete: Asphaltic paint.
- B. Concealed Steel Surfaces: Galvanized to ASTM A123/A123M requirements.
- C. Aluminum: Anodized to dark bronze, color as selected.
- D. Finial: Spun finish.

## **PART 3 EXECUTION**

### **3.01 EXAMINATION**

- A. Verify that concrete foundation is ready to receive work and dimensions are as indicated on shop drawings.

### **3.02 PREPARATION**

- A. Coat metal sleeve surfaces below grade and surfaces in contact with dissimilar materials with asphaltic paint.

### **3.03 INSTALLATION**

- A. Install flagpole, base assembly, and fittings in accordance with manufacturer's instructions.
- B. Fill foundation tube sleeve with sand and compact.
- C. Install foundation plate and centering wedges for flagpoles base set in concrete base and fasten.

### **3.04 TOLERANCES**

- A. Maximum Variation From Plumb: 1 inch.

### **3.05 ADJUSTING**

- A. Adjust operating devices so that halyard function smoothly.

**END OF SECTION**

**SECTION 11 30 13  
RESIDENTIAL APPLIANCES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Kitchen appliances.

**1.02 RELATED REQUIREMENTS**

- A. Section 26 05 83 - Wiring Connections: Electrical connections for appliances.

**1.03 REFERENCE STANDARDS**

- A. UL (DIR) - Online Certifications Directory Current Edition.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Manufacturer's data indicating dimensions, capacity, and operating features of each piece of residential equipment specified.
- C. Copies of Warranties: Submit manufacturer warranty and ensure that forms have been completed in Owner's name and registered with manufacturer.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than three years of experience.
- B. Electric Appliances: Listed and labeled by UL (DIR) and complying with NEMA Standards (National Electrical Manufacturers Association).
- C. Gas Appliances: Bearing design certification seal of American Gas Association (AGA).

**1.06 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Provide five (5) year manufacturer warranty on refrigeration system of refrigerators.
- C. Provide ten (10) year manufacturer warranty on magnetron tube of microwave ovens.
- D. Provide ten (10) year manufacturer warranty on tub and door liner of dishwashers.

**PART 2 PRODUCTS**

**2.01 KITCHEN APPLIANCES**

- A. Provide Equipment Eligible for Energy Star Rating: Energy Star Rated.
- B. Refrigerator: Furnished and installed by Owner.
- C. Range: Natural gas, free-standing, with two (2) ovens.
  - 1. Size: 48 inches wide.
  - 2. Oven: Self-cleaning with electronic ignition.
  - 3. Burners: Six (6) and infrared griddle.
  - 4. Controls: Solid state electronic.
  - 5. Features: Include oven door window, broiler pan and grid, and oven light.
  - 6. Exterior Finish: Stainless steel.
    - a. Knobs: Red.
  - 7. Manufacturers:
    - a. Wolf model GR486G; [www.subzero-wolf.com](http://www.subzero-wolf.com).
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- D. Cooking Exhaust: Range hood.
  - 1. Size: 48 inches wide.
  - 2. Fan: Variable-speed, 600 cfm

3. Exhaust: remote fan, vented to exterior.
  4. Features: Include cooktop light, night light, backdraft damper, and removable grease filter.
  5. Exterior Finish: Stainless steel.
  6. Manufacturers:
    - a. Wolf model PW482210 with 810428 38" high stainless steel wall backsplash.
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- E. Microwave: Furnished and installed by Owner.
- F. Dishwasher: Undercounter.
1. Controls: Solid state electronic.
  2. Wash Levels: Three (3).
  3. Cycles: Five (5), including normal and 1-hour, auto sense, heavy, light.
  4. Features: Include fan assist drying, hard food disposer, steam and sanitize cycles, .
  5. Finish: Stainless steel , fingerprint resistant.
  6. Manufacturers:
    - a. Bosch SHEM63W55N / 13FD000904346.
    - b. Substitutions: See Section 01 60 00 - Product Requirements.
- G. Coffee Maker: Countertop model.
1. Unit plumbed to water line, adjusts automatically for varying water pressure.
  2. Automatic warmer shut-off.
  3. Technology capable of calculating flow rate and adjusting brew time to maintain consistent pot levels based upon lime build-up and calcification.
  4. Electronic diagnostics with built-in tank drain.
  5. Minimum 200 ounce tank capacity to permit back-to-back brewing.
  6. Coffee quality assurance features, set from front of machine:
    - a. Programming for brew level.
    - b. Cold-brew lockout.
    - c. Tank temperature.
  7. Coffee extraction controlled with:
    - a. Programmable pre-infusion
    - b. Pulse brew
    - c. Digital temperature precision.
  8. Energy-saver mode to reduce tank temperature during idle periods.
  9. Hot water faucet.
  10. Funnel to deflect hot liquids away from hands.
  11. Decanters:
    - a. Provide 3 with black handle for regular coffee.
    - b. Provide 2 with orange handle for decaf coffee.
    - c. Stainless steel base, easy pour type.
  12. Manufacturer:
    - a. Bunn; Axiom-15-3 (2U/ 1L Warmer): bunn.com.
- H. Ice Maker: Floor model.
1. Production capacity: Minimum 135 lbs. per day.
  2. Ice shape: Dice.
  3. Storage capacity: 90 lbs.
  4. Manufacturer:
    - a. Manitowoc; NEO 140, Model UDF-0140A: www.manitowocice.com.
- I. Gas Grill: Outdoor usage.
1. Fuel type: Natural gas.
  2. Number of burners: Three.

3. Color: Black.
4. Hose: 10 feet long, flexible.
5. Features:
  - a. Built-in thermometer.
  - b. Porcelain-enameled lid and cooking grates.
  - c. Grease management system.
  - d. Removable catch pan.
  - e. Stainless steel burners w/ 39,000 BTU/ hour input.
6. Warranty: 10 years.
7. Manufacturer:
  - a. Weber; Genesis II, E-310: [www.weber.com](http://www.weber.com).

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Verify utility rough-ins are provided and correctly located.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions.
- B. Anchor built-in equipment in place.

#### **3.03 CLEANING**

- A. Remove packing materials from equipment and properly discard.
- B. Wash and clean equipment.

**END OF SECTION**

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**SECTION 12 24 00  
WINDOW SHADES**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Interior manual roller shades.

**1.02 RELATED REQUIREMENTS**

- A. Section 06 10 00 - Rough Carpentry: Concealed wood blocking for attachment of headrail brackets.

**1.03 REFERENCE STANDARDS**

- A. NFPA 701 - Standard Methods of Fire Tests for Flame Propagation of Textiles and Films 2019.
- B. WCMA A100.1 - Safety of Window Covering Products 2018.

**1.04 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Provide manufacturer's standard catalog pages and data sheets, including materials, finishes, fabrication details, dimensions, profiles, mounting requirements, and accessories.
- C. Shop Drawings: Include shade schedule indicating size, location and keys to details, head, jamb and sill details, mounting dimension requirements for each product and condition, and operation direction.
- D. Selection Samples: Include fabric samples in full range of available colors and patterns.
- E. Warranty: Submit sample of manufacturer's warranty and documentation of final executed warranty completed in Owner's name and registered with manufacturer.

**1.05 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section, with not less than five years of experience.
- B. Installer Qualifications: Company specializing in performing work of this type with minimum three years of experience with shading systems of similar size and type.

**1.06 DELIVERY, STORAGE, AND HANDLING**

- A. Deliver shades in manufacturer's unopened packaging, labeled to identify each shade for each opening.
- B. Handle and store shades in accordance with manufacturer's recommendations.

**PART 2 PRODUCTS**

**2.01 ROLLER SHADES**

- A. General:
  - 1. Provide shade system components that are easy to remove or adjust without removal of mounted shade brackets.
  - 2. Provide shade system that operates smoothly when shades are raised or lowered.
- B. Roller Shades - Basis of Design: MechoShade Systems LLC; Mecho/5 System; [www.mechoshade.com/#sle](http://www.mechoshade.com/#sle).
  - 1. Description: Single and Double roller, manually operated fabric window shades.
  - 2. Brackets and Mounting Hardware: As recommended by manufacturer for mounting indicated and to accommodate shade fabric roll-up size and weight.
  - 3. Roller Tubes:
    - a. Material: Extruded aluminum.

- b. Size: As recommended by manufacturer; selected for suitability for installation conditions, span, and weight of shades.
  - c. Fabric Attachment: Utilize extruded channel in tube to accept vinyl spline welded to fabric edge. Shade band to be removable and replaceable without removing roller tube from brackets or inserting spline from the side of the roller tube.
  - d. Roller tubes to be capable of being removed and reinstalled without affecting roller shade limit adjustments.
4. Hembars: Designed to maintain bottom of shade straight and flat.
    - a. Style: Full wrap fabric covered bottom bar, flat profile with heat sealed closed ends.
  5. Clutch Operator: Manufacturer's standard material and design integrated with bracket/brake assembly.
    - a. Provide a permanently lubricated brake assembly mounted on an oil-impregnated hub with wrapped spring clutch.
    - b. Brake must withstand minimum pull force of 50 pounds in the stopped position.
    - c. Mount clutch/brake assembly on the support brackets, fully independent of the roller tube components.
  6. Drive Chain: Continuous loop stainless steel beaded ball chain, 95 pound minimum breaking strength. Provide upper and lower limit stops.
    - a. Chain Retainer: Chain tensioning device complying with WCMA A100.1.
  7. Accessories:
    - a. Fascia: Extruded aluminum, size as required to conceal shade mounting, attachable to brackets without exposed fasteners; clear anodized finish.
      - 1) Color: To be selected by Architect.
      - 2) Profile: Square.

## 2.02 SHADE FABRIC

- A. Fabric - Type Offices: Nonflammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
  1. Manufacturers:
    - a. MechoShade Systems LLC; ThermoVeil Basket Weave - 1500 Series (3% open): [www.mechoshade.com/#sle](http://www.mechoshade.com/#sle).
  2. Material: Vinyl coated polyester.
  3. Performance Requirements:
    - a. Flammability: Pass NFPA 701 large and small tests.
  4. Openness Factor: 3%.
  5. Color: As selected by Architect from manufacturer's full range of colors.
- B. Fabric - Type Bunk Rooms: Nonflammable, color-fast, impervious to heat and moisture, and able to retain its shape under normal operation.
  1. Manufacturers:
    - a. MechoShade Systems LLC; ThermoVeil Basket Weave - 1500 Series (3% open): Roll 1; [www.mechoshade.com/#sle](http://www.mechoshade.com/#sle).
    - b. MechoShade Systems LLC; Blackout - Equinox Blackout Series 0200 (opaque): Roll 2; [www.mechoshade.com/#sle](http://www.mechoshade.com/#sle).
  2. Material: Vinyl coated polyester.
  3. Performance Requirements:
    - a. Flammability: Pass NFPA 701 large and small tests.
  4. Color: As selected by Architect from manufacturer's full range of colors.

## 2.03 ROLLER SHADE FABRICATION

- A. Field measure finished openings prior to ordering or fabrication.
- B. Dimensional Tolerances: Fabricate shades to fit openings within specified tolerances.
  1. Vertical Dimensions: Fill openings from head to sill with 1/2 inch space between bottom bar and window stool.

2. Horizontal Dimensions - Inside Mounting: Provide symmetrical light gaps on both sides of shade not to exceed 1/2 inch total.

### **PART 3 EXECUTION**

#### **3.01 EXAMINATION**

- A. Examine finished openings for deficiencies that may preclude satisfactory installation.
- B. Start of installation shall be considered acceptance of substrates.

#### **3.02 INSTALLATION**

- A. Install in accordance with manufacturer's instructions and approved shop drawings, using mounting devices as indicated.
- B. Adjust level, projection, and shade centering from mounting bracket. Verify there is no telescoping of shade fabric. Ensure smooth shade operation.

#### **3.03 CLEANING**

- A. Clean soiled shades and exposed components as recommended by manufacturer.
- B. Replace shades that cannot be cleaned to "like new" condition.

**END OF SECTION**



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**SECTION 12 32 00  
MANUFACTURED WOOD CASEWORK**

**PART 1 GENERAL**

**1.01 SECTION INCLUDES**

- A. Manufactured custom casework, with cabinet hardware.
- B. Countertops and Window Sills.

**1.02 RELATED REQUIREMENTS**

**1.03 DEFINITIONS**

- A. Exposed: Portions of casework visible when drawers and cabinet doors are closed, including end panels, bottoms of cases more than 42 inches above finished floor, tops of cases less than 72 inches above finished floor and all members visible in open cases or behind glass doors.
- B. Semi-Exposed: Portions of casework and surfaces behind solid doors, tops of cases more than 72 inches above finished floor and bottoms of cabinets more than 30 inches but less than 42 inches above finished floor.
- C. Concealed: Sleepers, web frames, dust panels and other surfaces not generally visible after installation and cabinets less than 30 inches above finished floor.

**1.04 REFERENCE STANDARDS**

- A. AWI (QCP) - Quality Certification Program Current Edition.
- B. AWI/AWMAC/WI (AWS) - Architectural Woodwork Standards 2014, with Errata (2018).
- C. AWMAC/WI (NAAWS) - North American Architectural Woodwork Standards, U.S. Version 3.1 2017, with Errata (2019).
- D. BHMA A156.9 - American National Standard for Cabinet Hardware 2015.
- E. ISFA 2-01 - Classification and Standards for Solid Surfacing Material 2013.
- F. NEMA LD 3 - High-Pressure Decorative Laminates 2005.

**1.05 SUBMITTALS**

- A. See Section 01 30 00 - Administrative Requirements, for submittal procedures.
- B. Product Data: Component dimensions, configurations, construction details, joint details, attachments.
- C. Shop Drawings: Indicate casework types, sizes, and locations, using large scale plans, elevations, and cross sections. Include rough-in and reinforcements and blocking, keying information.
- D. Samples for Finish Selection: Fully finished, for color selection. Minimum sample size: 2 inches by 3 inches.
  - 1. Plastic laminate samples, for color, texture, and finish selection.
- E. Manufacturer's Qualification Statement.
- F. Maintenance Data: Manufacturer's recommendations for care and cleaning.
- G. Finish touch-up kit for each type and color of materials provided.

**1.06 QUALITY ASSURANCE**

- A. Manufacturer Qualifications: Company specializing in manufacturing the products specified in this section with minimum three years of experience.
- B. Quality Certification: Comply with AWI (QCP) woodwork association quality certification service/program in accordance with requirements for work specified in this section.
  - 1. Provide labels or certificates indicating that the installed work complies with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS) requirements for grade or grades

- specified.
- 2. Submit certifications upon completion of installation that verifies this work is in compliance with specified requirements.
- 3. Replace, repair, or rework all work for which certification is refused.
- C. Installer Qualifications: Company specializing in performing work of the type specified in this section, with not less than three years of experience.

#### **1.07 DELIVERY, STORAGE, AND HANDLING**

- A. Protect items provided by this section, including finished surfaces and hardware items during handling and installation. For metal surfaces, use polyethylene film or other protective material standard with the manufacturer.
- B. Acceptance at Site:
  - 1. Do not deliver or install casework until the conditions specified under Part 3, Examination Article of this section have been met. Products delivered to sites that are not enclosed and/or improperly conditioned will not be accepted if warping or damage due to unsatisfactory conditions occurs.
- C. Storage:
  - 1. Store casework in the area of installation. If necessary, prior to installation, temporarily store in another area, meeting the environmental requirements specified under Part 3, "Site Verification of Conditions" Article of this section.

#### **1.08 WARRANTY**

- A. See Section 01 78 00 - Closeout Submittals, for additional warranty requirements.
- B. Correct defective Work within a five year period after Date of Substantial Completion, at no additional cost to Owner. Defects include, but are not limited to:
  - 1. Ruptured, cracked, or stained finish coating.
  - 2. Discoloration or lack of finish integrity.
  - 3. Cracking or peeling of finish.
  - 4. Failure of hardware.

### **PART 2 PRODUCTS**

#### **2.01 CASEWORK, GENERAL**

- A. Quality Standard: AWI/AWMAC/WI (AWS), unless noted otherwise.
- B. Plastic Laminate Faced Cabinets: Custom Grade.

#### **2.02 FABRICATION**

- A. Assembly: Shop assemble casework items for delivery to site in units easily handled and to permit passage through building openings.
- B. Construction: As required for selected grade.
- C. Hardware Application: Factory-machine casework members for hardware that is not surface applied.
- D. Edging: Fit shelves, doors, and exposed edges with specified edging. Do not use more than one piece for any single length.
- E. Scribes and Fillers: Panels of matching construction and finish, for locations where cabinets do not fit tight to adjacent construction.

#### **2.03 PLASTIC-LAMINATE-CLAD CASEWORK**

- A. Plastic-Laminate-Clad Casework: Solid wood and wood panel construction; each unit self-contained and not dependent on adjacent units or building structure for rigidity; in sizes necessary to avoid field cutting except for scribes and filler panels. Include adjustable levelers for base cabinets.
  - 1. Style: Flush overlay. Ease doors and drawer fronts slightly at edges.

2. Plastic Laminate: Apply plastic laminate finish in full uninterrupted sheets consistent with manufactured sizes. Fit corners and joints hairline.
  - a. Finish: Matte or suede, gloss rating of 5 to 20.
  - b. Surface Color and Pattern: As selected by Architect from manufacturer's full line.
  - c. Exposed Interior Surfaces: Thermally fused laminate.
    - 1) Color: White.
  - d. Apply laminate backing sheet to reverse side of plastic laminate finished surfaces.

#### **2.04 COUNTERTOPS AND WINDOW SILLS**

- A. Types: More than one type is required. See drawings for location of each type of countertop.
- B. Fabricate in accordance with AWI/AWMAC/WI (AWS) or AWMAC/WI (NAAWS), Section 11 - Countertops, Custom Grade, unless otherwise noted.
- C. Solid Surfacing Countertops and Window Sills: Solid surfacing sheet or plastic resin casting over continuous substrate.
  1. Solid Surfacing Sheet and Plastic Resin Castings: Complying with ISFA 2-01 and NEMA LD 3; acrylic or polyester resin, mineral filler, and pigments; homogenous, non-porous and capable of being worked and repaired using standard woodworking tools; no surface coating; color and pattern consistent throughout thickness.
  2. Custom configuration for exposed edges, back and end splashes, with details indicated on drawings.
  3. Fabricate in accordance with manufacturer's standard requirements.
- D. Natural Quartz and Resin Composite Countertops: Sheet or slab of natural quartz and plastic resin over continuous substrate.
  1. Custom configuration for exposed edges, back and end splashes, with details indicated on drawings.
  2. Fabricate in accordance with manufacturer's standard requirements.

#### **2.05 CABINET HARDWARE**

- A. Comply with BHMA A156.9 requirements.
- B. Locks: Provide locks on casework drawers and doors where indicated. Lock with 5 pin cylinder and 2 keys per lock.
- C. Shelves in Cabinets:
  1. Shelf Rests: Vertical rows of holes bored in case sides for metal shelf support pins, satin chromium plated over nickel on base material.
- D. Swinging Doors: Hinges and pulls.
  1. Hinges: Concealed, number as required by referenced standards for width, height, and weight of door.
    - a. Concealed Hinges: Installed in cabinet edge, and on door back, bright chromium plated over nickel on base material.
      - 1) European-Style Hinges for Overlay Doors: 170 degree opening angle, self-closing function.
  2. Pulls: Chrome wire pulls, 4 inches wide.
- E. Drawers: Pulls and slides.
  1. Pulls: Chrome wire pulls, 4 inches wide.
  2. Slides: Steel, full extension arms, ball bearings; self-closing; capacity as recommended by manufacturer for drawer height and width.

#### **2.06 MATERIALS**

- A. Wood-Based Materials:
  1. Solid Wood: Air-dried to 4.5 percent moisture content, then tempered to 6 percent moisture content before use.

- B. Concealed Solid Wood or Plywood: Any species and without defects affecting strength or utility.
- C. High Pressure Decorative Laminate (HPDL): NEMA LD 3, types as recommended for specific applications. complying with Grade requirements, and standard with the manufacturer.
- D. Thermally Fused Laminate (TFL): Melamine resin, NEMA LD 3, Type VGL laminate panels.

## **2.07 ACCESSORIES**

- A. Plastic Edge Banding: Extruded PVC, flat shaped; smooth finish; 3mm thickness, hot melt adhesive applied; of width to match component thickness.
  - 1. Color: As selected by Architect from manufacturer's standard range.
  - 2. Use at exposed shelf, door and drawer front edges.
- B. Concealed Joint Fasteners: Corrosion-resistant, standard with manufacturer.
- C. Grommets: Standard plastic, painted metal, or rubber grommets for cut-outs, in color to match adjacent surface.

## **PART 3 EXECUTION**

### **3.01 PREPARATION**

- A. Large Components: Ensure that large components can be moved into final position without damage to other construction.

### **3.02 EXAMINATION**

- A. Site Verification of Environmental Conditions:
  - 1. Do not deliver casework until the following conditions have been met:
    - a. Building has been enclosed (windows and doors sealed and weather-tight).
    - b. An operational HVAC system that maintains temperature and humidity at occupancy levels has been put in place.
    - c. Ceiling, overhead ductwork, piping, and lighting have been installed.
    - d. Installation areas do not require further "wet work" construction.
- B. Verify adequacy of support framing and anchors.
- C. Verify that service connections are correctly located and of proper characteristics.

### **3.03 INSTALLATION**

- A. Perform installation in accordance with manufacturer's instructions.
- B. Use anchoring devices to suit conditions and substrate materials encountered. Use concealed fasteners to the greatest degree possible. Use exposed fasteners only where allowed by approved shop drawings, or where concealed fasteners are impracticable.
- C. Set casework items plumb and square, securely anchored to building structure.
- D. Align cabinets to adjoining components, install filler and/or scribe panels where necessary to close gaps.
- E. Fasten together cabinets in continuous runs, with joints flush, uniform and tight. Misalignment of adjacent units not to exceed 1/16 inch. In addition, do not exceed the following tolerances:
  - 1. Variation of Tops of Base Cabinets from Level: 1/16 inch in 10 feet.
  - 2. Variation of Faces of Cabinets from a True Plane: 1/8 inch in 10 feet.
  - 3. Variation of Adjacent Surfaces from a True Plane (Lippage): 1/32 inch.
  - 4. Variation in Alignment of Adjacent Door and Drawer Edges: 1/16 inch.
- F. Base Cabinets: Fasten cabinets to service space framing and/or wall substrates, with fasteners spaced not more than 16 inches on center. Bolt adjacent cabinets together with joints flush, tight, and uniform.
- G. Install hardware uniformly and precisely.

- H. Countertops: Install countertops intended and furnished for field installation in one true plane, with ends abutting at hairline joints, and no raised edges.
- I. Replace units that are damaged, including those that have damaged finishes.

**3.04 ADJUSTING**

- A. Adjust operating parts, including doors, drawers, hardware, and fixtures to function smoothly.

**3.05 PROTECTION**

- A. Do not permit finished casework to be exposed to continued construction activity.
- B. Protect casework and countertops from ongoing construction activities. Prevent workmen from standing on, or storing tools and materials on casework or countertops.
- C. Repair damage, including to finishes, that occurs prior to Date of Substantial Completion, using methods prescribed by manufacturer; replace units that cannot be repaired to like-new condition.

**END OF SECTION**

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