PROJECT MANUAL and SPECIFICATIONS

May 16, 2014
edi Project No. 13012

for:

PLATINUM APARTMENTS
4120 Silver Ave LLC

prepared by:

edi
regenerating architecture
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PLATINUM APARTMENTS
ALBUQUERQUE, NEW MEXICO

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<td>a. Provide &quot;cut sheets&quot; of exposed to view fixtures and equipment including diffuses, fans, grills, etc.</td>
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<td>b. Provide product data, capacities, installation information, on each furnace, condenser, fan unit, etc.</td>
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<td>c. Provide controls Submittal.</td>
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<td>Provide Submittal on each piece of service entrance equipment, panelboard, switches, raceway, wiremold.</td>
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<td>Provide &quot;cut sheets&quot; of each light fixture type and data.</td>
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## 13012 – Platinum Apartments

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REMARKS:
1. ....
2. Engineer stamp in state of construction required for pre-engineered items.
3. ....
4. ....
5. a. Provide "cut sheets" of exposed to view fixtures and equipment including diffuses, fans, grills, etc.
   b. Provide product data, capacities, installation information, on each furnace, condenser, fan unit, etc.
   c. Provide controls Submittal.
6. Provide Submittal on each piece of service entrance equipment, panelboard, switches, raceway, wiremold.
7. Provide "cut sheets" of each light fixture type and data.
8. Provide submittal info on each system including alarm, communication and monitoring systems.
9. ....
10. ....
11. ....
DOCUMENT 00 0101 - PROJECT TITLE PAGE

1.1 PROJECT MANUAL

A. Architect Project No.: 13012
B. Project Name: Platinum Apartments
C. Project Address: 4100 Silver Avenue
Albuquerque, New Mexico 87108
D. Project Owner: 4120 Silver Ave. LLC – Owner
E. Project Owner Address: 4700 N. Ravenswood Suite B
Chicago, Illinois 60640
F. Project Architect: Environmental Dynamics, Inc. (EDI)
G. Project Architect Address: 142 Truman St. NE Suite A1
Albuquerque, New Mexico 87108
H. Project Architect Phone: 505.242.2851
I. Project Architect Web: www.edi-arch.com
J. Project Manual Issued: January 24, 2014
K. Copyright: 2014 Environmental Dynamics, Inc. All rights reserved.

END OF DOCUMENT 00 0101
1.1 GEOTECHNICAL DATA

A. This Document with its referenced attachments is part of the Procurement and Contracting Requirements for Project. They provide Owner's information for Bidders' convenience and are intended to supplement rather than serve in lieu of Bidders' own investigations. They are made available for Bidders' convenience and information, but are not a warranty of existing conditions. This Document and its attachments are not part of the Contract Documents.

B. A geotechnical investigation report for Project, obtained by the Owner and prepared by Earthworks Engineering Group, LLC, dated August 1, 2013, is available for viewing at the office of Architect.

END OF DOCUMENT 00 3132
SECTION 01 1000 - SUMMARY

PART 1 - GENERAL

1.1 SUMMARY
   
   A. Section Includes:
      
      1. Project information.
      2. Work covered by Contract Documents.
      3. Access to site.
      4. Work restrictions.
      5. Specification and drawing conventions.

   B. Related Requirements:
      
      1. Section 01 5000 “Temporary Facilities and Controls” for limitations and procedures governing temporary use of Owner's facilities.

1.2 PROJECT INFORMATION
   
   A. Project Identification: Platinum Apartments
   
   B. Architect’s Project Number: 13012
      
      1. Project Location: 4100 Silver Ave SE, Albuquerque, New Mexico
   
   C. Owner: 4120 Silver Ave LLC
      
      4700 N. Ravenswood Suite B
      Chicago, Illinois 60640
      
      1. Owner's Representative: Ike Hong
      
      Phone: 1.773.290.1570
      
      Email: ike@pschicago.com

   D. Architect: Environmental Dynamics, Inc. (EDI)
      
      1. Architect of Record: Kent Beierle
      
      Phone: 1.505.242.2851
      
      Email: kent@edi-arch.com

1.3 WORK COVERED BY CONTRACT DOCUMENTS
   
   A. The Work of Project is defined by the Contract Documents and consists of the following:
      
      1. A zero lot-line, 4 story, wood framed, stucco finished, 75 unit market rate apartment building and associated site improvements. Surface parking for the building is
primarily contained within the lot behind and under the living units. The approximately 58,000 sf (conditioned) building incorporates private outdoor balconies at every unit and common roof terraces for the residents. Mechanical systems are “mini-split” fan coil type. The project is anticipating LEED for Homes Platinum certification.

2. Project will be constructed under a single prime contract.

1.4 ACCESS TO SITE

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

B. Use of Site: Limit use of Project site as indicated. Do not disturb portions of Project site beyond areas in which the Work is indicated.

1. Driveways, Walkways and Entrances: Keep walkways and entrances serving adjoining premises clear and available to occupants and emergency vehicles at all times. Do not use these areas for parking or storage of materials.

   a. Schedule deliveries to minimize use of driveways and entrances by construction operations.

   b. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on-site.

1.5 WORK RESTRICTIONS

A. Work Restrictions, General: Comply with restrictions on construction operations.

   1. Comply with limitations on use of public streets and with other requirements of authorities having jurisdiction.

B. On-Site Work Hours: Limit work on the site to normal business working hours, Monday through Saturday, unless otherwise indicated.

   1. Refer to City of Albuquerque Zoning Code for specific limitations for work and specific activities.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by others unless permitted under the following conditions and then only after providing temporary utility services according to requirements indicated:

   1. Notify Architect and Owner not less than two days in advance of proposed utility interruptions.

D. Controlled Substances: Use of tobacco products and other controlled substances on Project site is not permitted.

1.6 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:
1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

2. Specification requirements are to be performed by Contractor unless specifically stated otherwise.

B. Division 01 General Requirements: Requirements of Sections in Division 01 apply to the Work of all Sections in the Specifications.

C. Drawing Coordination: Requirements for materials and products identified on Drawings are described in detail in the Specifications. One or more of the following are used on Drawings to identify materials and products:

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.

2. Keynoting: Materials and products are identified by reference keynotes referencing materials found in this Project Manual.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 1000
SECTION 01 2500 - SUBSTITUTION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes administrative and procedural requirements for substitutions.
B. Related Requirements:
   1. Section 01 6000 "Product Requirements" for requirements for submitting comparable product submittals for products by listed manufacturers.

1.2 DEFINITIONS
A. Substitutions: Changes in products, materials, equipment, and methods of construction from those required by the Contract Documents and proposed by Contractor.

1.3 ACTION SUBMITTALS
A. Substitution Requests: Submit three copies of each request for consideration. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.
   1. Substitution Request Form: Use form acceptable to Architect.
   2. Documentation: Show compliance with requirements for substitutions and the following, as applicable:
      a. Statement indicating why specified product or fabrication or installation cannot be provided, if applicable.
      b. Coordination information, including a list of changes or revisions needed to other parts of the Work and to construction performed by Owner and separate contractors, that will be necessary to accommodate proposed substitution.
      c. Detailed comparison of significant qualities of proposed substitution with those of the Work specified. Include annotated copy of applicable Specification Section. Significant qualities may include attributes such as performance, weight, size, durability, visual effect, sustainable design characteristics, warranties, and specific features and requirements indicated. Indicate deviations, if any, from the Work specified.
      d. Product Data, including drawings and descriptions of products and fabrication and installation procedures.
      e. Samples, where applicable or requested.
      f. Certificates and qualification data, where applicable or requested.
      g. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners.
      h. Material test reports from a qualified testing agency indicating and interpreting test results for compliance with requirements indicated.
i. Research reports evidencing compliance with building code in effect for Project.

j. Detailed comparison of Contractor's construction schedule using proposed substitution with products specified for the Work, including effect on the overall Contract Time. If specified product or method of construction cannot be provided within the Contract Time, include letter from manufacturer, on manufacturer's letterhead, stating date of receipt of purchase order, lack of availability, or delays in delivery.

k. Cost information, including a proposal of change, if any, in the Contract Sum.

l. Contractor's certification that proposed substitution complies with requirements in the Contract Documents except as indicated in substitution request, is compatible with related materials, and is appropriate for applications indicated.

m. Contractor's waiver of rights to additional payment or time that may subsequently become necessary because of failure of proposed substitution to produce indicated results.

3. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within seven (7) days of receipt of a request for substitution. Architect will notify Contractor of acceptance or rejection of proposed substitution within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.


   b. Use product specified if Architect does not issue a decision on use of a proposed substitution within time allocated.

1.4 QUALITY ASSURANCE

A. Compatibility of Substitutions: Investigate and document compatibility of proposed substitution with related products and materials. Engage a qualified testing agency to perform compatibility tests recommended by manufacturers.

PART 2 - PRODUCTS

2.1 SUBSTITUTIONS

A. Substitutions for Cause: Submit requests for substitution immediately on discovery of need for change, but not later than fifteen (15) days prior to time required for preparation and review of related submittals.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

   a. Requested substitution is consistent with the Contract Documents and will produce indicated results.

   b. Requested substitution provides sustainable design characteristics equivalent or greater than the specified product provided.

   c. Requested substitution will not adversely affect Contractor's construction schedule.
d. Requested substitution has received necessary approvals of authorities having jurisdiction.

e. Requested substitution is compatible with other portions of the Work.

f. Requested substitution has been coordinated with other portions of the Work.

g. Requested substitution provides specified warranty.

h. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

B. Substitutions for Convenience: Architect will consider requests for substitution if received within 60 days after the Notice to Proceed.

1. Conditions: Architect will consider Contractor's request for substitution when the following conditions are satisfied:

   a. Requested substitution offers Owner a substantial advantage in cost, time, energy conservation, or other considerations, after deducting additional responsibilities Owner must assume. Owner's additional responsibilities may include compensation to Architect for redesign and evaluation services, increased cost of other construction by Owner, and similar considerations.

   b. Requested substitution does not require extensive revisions to the Contract Documents.

   c. Requested substitution is consistent with the Contract Documents and will produce indicated results.

   d. Requested substitution provides sustainable design characteristics that are equivalent or greater than specified product provided.

   e. Requested substitution will not adversely affect Contractor's construction schedule.

   f. Requested substitution has received necessary approvals of authorities having jurisdiction.

   g. Requested substitution is compatible with other portions of the Work.

   h. Requested substitution has been coordinated with other portions of the Work.

   i. Requested substitution provides specified warranty.

   j. If requested substitution involves more than one contractor, requested substitution has been coordinated with other portions of the Work, is uniform and consistent, is compatible with other products, and is acceptable to all contractors involved.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2500
SECTION 01 2600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes administrative and procedural requirements for handling and processing Contract modifications.

1.2 MINOR CHANGES IN THE WORK
A. Architect will issue supplemental instructions authorizing minor changes in the Work, not involving adjustment to the Contract Sum or the Contract Time, on AIA Document G710, "Architect's Supplemental Instructions."

1.3 PROPOSAL REQUESTS
A. Owner-Initiated Proposal Requests: Architect will issue a detailed description of proposed changes in the Work that may require adjustment to the Contract Sum or the Contract Time. If necessary, the description will include supplemental or revised Drawings and Specifications.
   1. Work Change Proposal Requests issued by Architect are not instructions either to stop work in progress or to execute the proposed change.
   2. Within 10 days, when not otherwise specified, after receipt of Proposal Request, submit a quotation estimating cost adjustments to the Contract Sum and the Contract Time necessary to execute the change.
      a. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.
      b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
      c. Include costs of labor and supervision directly attributable to the change.
      d. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.
      e. Quotation Form: Use forms acceptable to Architect.

B. Contractor-Initiated Work Change Proposals: If latent or changed conditions require modifications to the Contract, Contractor may initiate a claim by submitting a request for a change to Architect.
   1. Include a statement outlining reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and the Contract Time.
2. Include a list of quantities of products required or eliminated and unit costs, with total amount of purchases and credits to be made. If requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Include costs of labor and supervision directly attributable to the change.

5. Include an updated Contractor's construction schedule that indicates the effect of the change, including, but not limited to, changes in activity duration, start and finish times, and activity relationship. Use available total float before requesting an extension of the Contract Time.

6. Comply with requirements in Section 01 2500 "Substitution Procedures" if the proposed change requires substitution of one product or system for product or system specified.


1.4 ADMINISTRATIVE CHANGE ORDERS

A. Allowance Adjustment: See Section 01 2100 "Allowances" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect actual costs of allowances.

1.5 CHANGE ORDER PROCEDURES


1.6 CONSTRUCTION CHANGE DIRECTIVE


1. Construction Change Directive contains a complete description of change in the Work. It also designates method to be followed to determine change in the Contract Sum or the Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2600

CONTRACT MODIFICATION PROCEDURES
SECTION 01 2900 - PAYMENT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes administrative and procedural requirements necessary to prepare and process Applications for Payment.
   B. Related Requirements:
      1. Section 01 2200 "Unit Prices" for administrative requirements governing the use of unit prices.
      2. Section 01 2600 "Contract Modification Procedures" for administrative procedures for handling changes to the Contract.
      3. Section 01 3200 "Construction Progress Documentation" for administrative requirements governing the preparation and submittal of the Contractor's construction schedule.

1.2 SCHEDULE OF VALUES
   A. Coordination: Coordinate preparation of the schedule of values with preparation of Contractor's construction schedule.
      1. Coordinate line items in the schedule of values with other required administrative forms and schedules, including the following:
         a. Application for Payment forms with continuation sheets.
         b. Submittal schedule.
         c. Items required to be indicated as separate activities in Contractor's construction schedule.
      2. Submit the schedule of values to Architect at earliest possible date but no later than fifteen (15) days before the date scheduled for submittal of initial Applications for Payment.
   B. Format and Content: Use Project Manual table of contents as a guide to establish line items for the schedule of values. Provide at least one line item for each Specification Section.
      1. Identification: Include the following Project identification on the schedule of values:
         a. Project name and location.
         b. Name of Architect.
         c. Architect's project number.
         d. Contractor's name and address.
         e. Date of submittal.
      2. Arrange schedule of values consistent with format of AIA Document G703.
3. Utilize AIA G702-703 to provide a breakdown of the Contract Sum by CSI division and in enough detail to facilitate continued evaluation of Applications for Payment and progress reports. Coordinate with Project Manual table of. Provide multiple line items per for principal subcontract amounts in excess of **five 5%** percent of the Contract Sum.

4. Round amounts to nearest whole dollar; total shall equal the Contract Sum.

5. Provide a separate line item in the schedule of values for each part of the Work where Applications for Payment may include materials or equipment purchased or fabricated and stored, but not yet installed.

6. Provide separate line items in the schedule of values for initial cost of materials, for each subsequent stage of completion, and for total installed value of that part of the Work.

7. Each item in the schedule of values and Applications for Payment shall be complete. Include total cost and proportionate share of general overhead and profit for each item.
   a. Temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown either as separate line items in the schedule of values or distributed as general overhead expense, at Contractor's option.

8. Schedule Updating: When Change Orders or Construction Change Directives result in a change in the Contract Sum, include each Change Order or Construction Change Directive as a new line item and resubmit the schedule of values before the next Application for Payment.

### 1.3 APPLICATIONS FOR PAYMENT

**A.** Each Application for Payment shall be consistent with previous applications and payments as certified by Architect and paid for by Owner.

   1. Initial Application for Payment, Application for Payment at time of Substantial Completion, and final Application for Payment involve additional requirements.

**B.** Payment Application Times: Submit Application for Payment to Architect by the last day of the month. The period covered by each Application for Payment is one month, ending on the **last day of the month**.

**C.** Application for Payment Forms: Use AIA Document G702 as form for Applications for Payment.

**D.** Application Preparation: Complete every entry on form. Notarize and execute by a person authorized to sign legal documents on behalf of Contractor. Architect will return incomplete applications without action.

   1. Entries shall match data on the schedule of values and Contractor's construction schedule. Use updated schedules if revisions were made.

   2. Include amounts of Change Orders and Construction Change Directives issued before last day of construction period covered by application.
E. Transmittal: Submit three (3) signed and notarized original copies of each Application for Payment to Architect by a method ensuring receipt within twenty-four (24). One copy shall include waivers of lien and similar attachments if required.
   1. Transmit each copy with a transmittal form listing attachments and recording appropriate information about application.

F. Waivers of Mechanic’s Lien: With each Application for Payment, submit waivers of mechanic’s lien from entities lawfully entitled to file a mechanic’s lien arising out of the Contract and related to the Work covered by the payment.
   1. Submit partial waivers on each item for amount requested in previous application, after deduction for retainage, on each item.
   2. When an application shows completion of an item, submit conditional final or full waivers.
   3. Owner reserves the right to designate which entities involved in the Work must submit waivers.
   4. Waiver Forms: Submit executed waivers of lien on forms acceptable to Owner.

G. Initial Application for Payment: Administrative actions and submittals that must precede or coincide with submittal of first Application for Payment include the following:
   1. Schedule of values.
   2. Contractor’s construction schedule (preliminary if not final).
   3. Submittal schedule (preliminary if not final).
   4. List of Contractor’s staff assignments.
   5. List of Contractor’s principal consultants.
   7. Initial progress report.
   9. Certificates of insurance and insurance policies.

H. Application for Payment at Substantial Completion: After Architect issues the Certificate of Substantial Completion, submit an Application for Payment showing 100 percent completion for portion of the Work claimed as substantially complete.
   1. Include documentation supporting claim that the Work is substantially complete and a statement showing an accounting of changes to the Contract Sum.
   2. This application shall reflect Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work.

I. Final Payment Application: After completing Project closeout requirements, submit final Application for Payment with releases and supporting documentation not previously submitted and accepted, including, but not limited, to the following:
   1. Evidence of completion of Project closeout requirements.
2. Insurance certificates for products and completed operations where required and proof that taxes, fees, and similar obligations were paid.

3. Updated final statement, accounting for final changes to the Contract Sum.


6. Evidence that claims have been settled.

7. Final meter readings for utilities, a measured record of stored fuel, and similar data as of date of Substantial Completion or when Owner took possession of and assumed responsibility for corresponding elements of the Work.

8. Final liquidated damages settlement statement.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 2900
SECTION 01 3100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:
      1. Coordination drawings.
      2. Requests for Information (RFIs).
      3. Project Web site.
      4. Project meetings.
   B. Related Requirements:
      1. Section 01 7300 "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.

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

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

1.4 GENERAL COORDINATION PROCEDURES
   A. Coordination: Coordinate construction operations included in different Sections of the Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations, included in different Sections, that depend on each other for proper installation, connection, and operation.
      1. Schedule construction operations in sequence required to obtain the best results where installation of one part of the Work depends on installation of other components, before or after its own installation.
      2. Coordinate installation of different components to ensure maximum performance and accessibility for required maintenance, service, and repair.
3. Make adequate provisions to accommodate items scheduled for later installation.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.
   1. Prepare similar memoranda for Owner and separate contractors if coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:
   1. Preparation of Contractor’s construction schedule.
   2. Preparation of the schedule of values.
   3. Installation and removal of temporary facilities and controls.
   4. Delivery and processing of submittals.
   5. Progress meetings.
   6. Preinstallation conferences.
   7. Project closeout activities.
   8. Startup and adjustment of systems.

1.5 COORDINATION DRAWINGS

A. Coordination Drawings, General: Prepare coordination drawings according to requirements in individual Sections, where installation is not completely shown on Shop Drawings, where limited space availability necessitates coordination, or if coordination is required to facilitate integration of products and materials fabricated or installed by more than one entity.

   1. Content: Project-specific information, drawn accurately to a scale large enough to indicate and resolve conflicts. Do not base coordination drawings on standard printed data. Include the following information, as applicable:
      a. Indicate functional and spatial relationships of components of architectural, structural, civil, mechanical, and electrical systems.
      b. Indicate dimensions shown on the Drawings. Specifically note dimensions that appear to be in conflict with submitted equipment and minimum clearance requirements. Provide alternate sketches to Architect indicating proposed resolution of such conflicts. Minor dimension changes and difficult installations will not be considered changes to the Contract.

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

   1. Floor Plans and Reflected Ceiling Plans: Show architectural and structural elements, and mechanical, plumbing, fire-protection, fire-alarm, and electrical Work. Show locations of visible ceiling-mounted devices relative to acoustical ceiling grid.

   2. Plenum Space: Indicate subframing for support of ceiling and wall systems, mechanical and electrical equipment, and related Work. Locate components within ceiling plenum to accommodate layout of light fixtures indicated on Drawings.
3. Mechanical Rooms: Provide coordination drawings for mechanical rooms showing plans and elevations of mechanical, plumbing, fire-protection, fire-alarm, and electrical equipment.

4. Structural Penetrations: Indicate penetrations and openings required for all disciplines.

5. Slab Edge and Embedded Items: Indicate slab edge locations and sizes and locations of embedded items for metal fabrications, sleeves, anchor bolts, bearing plates, angles, door floor closers, slab depressions for floor finishes, curbs and housekeeping pads, and similar items.

6. Review: Architect will review coordination drawings to confirm that the Work is being coordinated, but not for the details of the coordination, which are Contractor's responsibility.

1.6 REQUESTS FOR INFORMATION (RFIs)

A. General: Immediately on discovery of the need for additional information or interpretation of the Contract Documents, Contractor shall prepare and submit an RFI in the form specified.

1. Architect will return RFIs submitted to Architect by other entities controlled by Contractor with no response.

2. Coordinate and submit RFIs in a prompt manner so as to avoid delays in Contractor's work or work of subcontractors.

B. Content of the RFI: Include a detailed, legible description of item needing information or interpretation and the following:

1. Project name.

2. Project number.

3. Date.

4. Name of Contractor.

5. Name of Architect[ and Construction Manager].

6. RFI number, numbered sequentially.

7. RFI subject.

8. Specification Section number and title and related paragraphs, as appropriate.

9. Drawing number and detail references, as appropriate.

10. Field dimensions and conditions, as appropriate.

11. Contractor's suggested resolution. If Contractor's solution(s) impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.

12. Contractor's signature.

13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

C. RFI Forms: AIA Document G716 or Software-generated form with substantially the same content as indicated above, acceptable to Architect.
D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven (7) working days for Architect's response for each RFI. RFIs received by Architect after 1:00 p.m. will be considered as received the following working day.

1. The following RFIs will be returned without action:
   a. Requests for approval of submittals.
   b. Requests for approval of substitutions.
   c. Requests for coordination information already indicated in the Contract Documents.
   d. Requests for adjustments in the Contract Time or the Contract Sum.
   e. Requests for interpretation of Architect's actions on submittals.
   f. Incomplete RFIs or inaccurately prepared RFIs.

2. Architect's action may include a request for additional information, in which case Architect's time for response will date from time of receipt of additional information.

3. Architect's action on RFIs that may result in a change to the Contract Time or the Contract Sum may be eligible for Contractor to submit Change Proposal according to Section 01 2600 "Contract Modification Procedures."
   a. If Contractor believes the RFI response warrants change in the Contract Time or the Contract Sum, notify Architect in writing within ten (10) days of receipt of the RFI response.

E. RFI Log: Prepare, maintain, and submit a tabular log of RFIs organized by the RFI number. Submit log at regular construction meeting. Include the following: Software log with not less than the following:

1. Project name.
2. Name and address of Contractor.
3. Name and address of Architect.
4. RFI number including RFIs that were dropped and not submitted.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

F. On receipt of Architect's action, update the RFI log and immediately distribute the RFI response to affected parties. Review response and notify Architect within seven (7) days if Contractor disagrees with response.

1. Identification of related Minor Change in the Work, Construction Change Directive, and Proposal Request, as appropriate.

1.7 PROJECT FTP SITE

A. Use Project FTP site provided by Owner or Architect for purposes of hosting and managing project communication and documentation until Final Completion.
1. FTP site will be provided as a convenience to the project team for digital file exchange and coordination and does not replace Owner, Contractor, Architect's standard approach to digital information storage and tracking.

2. Contractor is responsible for maintaining a copy of current information outside of the FTP site and final assembly of digital information and closeout documentation.

3. All parties relying on the FTP site are to maintain a current copy of their data on their own systems.

4. The FTP host is not liable for loss of information from the FTP site by wilful or inadvertent acts of any user, theft or damage of hardware, or acts of god.

B. Project FTP site shall include the following functions:

1. Project directory.
2. Project correspondence.
3. Meeting minutes.
5. RFI forms and logs.
6. Task and issue management.
7. Photo documentation.
8. Schedule and calendar management.
10. Payment application forms.
11. Drawing and specification document hosting, viewing, and updating.

C. Access will be provided for use of Contractor, Owner, LEED for Homes Consultant, Architect, and Architect's consultants. Allow for eight hours of preconstruction coordination of file structure and FTP site use strategy and planning at Architect's office.

D. On completion of Project, provide one complete archive copy of all digital files to Owner and to Architect in a digital storage format acceptable to Architect.

E. Contractor, subcontractors, and other parties granted access by Contractor to Project Web site shall execute a data licensing agreement in the form of AIA Document C106.

1.8 PROJECT MEETINGS

A. General: Schedule and conduct regular progress and conferences at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Keep Owner and Architect should regular meeting time and date need to deviate from scheduled meeting dates and times.

2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees prior to the meeting.
3. Minutes: Contractor responsible for conducting meeting and will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner and Architect, within three (3) days of the meeting.

B. Preconstruction Conference: Owner and Architect will schedule and conduct a preconstruction conference before starting construction, at a time convenient to Owner, Architect, and Contractor, but no later than fifteen (15) days after execution of the Agreement.

1. Attendees: Authorized representatives of Owner, LEED for Homes Provider, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Discuss items of significance that could affect progress, including the following:
   a. Tentative construction schedule.
   b. Critical work sequencing and long-lead items.
   c. Designation of key personnel and their duties.
   d. Procedures for processing field decisions and Change Orders.
   e. Procedures for RFIs.
   f. Procedures for testing and inspecting.
   g. Procedures for processing Applications for Payment.
   h. Distribution of the Contract Documents.
   i. Submittal procedures.
   j. LEED requirements/Sustainable design requirements.
   k. Preparation of record documents.
   l. Use of the premises.
   m. Work restrictions.
   n. Working hours.
   o. Owner's occupancy requirements.
   p. Responsibility for temporary facilities and controls.
   q. Procedures for moisture and mold control.
   r. Procedures for disruptions and shutdowns.
   s. Construction waste management and recycling.
   t. Parking availability.
   u. Office, work, and storage areas.
   v. Equipment deliveries and priorities.
   w. First aid.
x. Security.
y. Progress cleaning.

3. Minutes: Architect will record and distribute meeting minutes.

C. Preinstallation Conferences: Conduct a preinstallation conference at Project site before each construction activity that requires coordination with other construction.

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect, Owner, and LEED for Homes Provider of scheduled meeting dates.

2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:
   b. Options.
   c. Related RFIs.
   d. Related Change Orders.
   e. Purchases.
   f. Deliveries.
   g. Submittals.
   h. LEED requirements/Sustainable design requirements.
   i. Review of mockups.
   j. Possible conflicts.
   k. Compatibility problems.
   l. Time schedules.
   m. Weather limitations.
   n. Manufacturer's written instructions.
   o. Warranty requirements.
   q. Acceptability of substrates.
   r. Temporary facilities and controls.
   s. Space and access limitations.
   t. Regulations of authorities having jurisdiction.
   u. Testing and inspecting requirements.
   v. Installation procedures.
   w. Coordination with other work.
   x. Required performance results.
y. Protection of adjacent work.
z. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.

4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.

5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

D. Progress Meetings: Conduct progress meetings at biweekly intervals.

1. Attendees: In addition to representatives of Owner, LEED for Home Provider, and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.

2. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

   a. Contractor's Construction Schedule: Review progress since the last meeting. Determine whether each activity is on time, ahead of schedule, or behind schedule, in relation to Contractor's construction schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

      1) Review schedule for next period.

   b. Review present and future needs of each entity present, including the following:

      1) Interface requirements.

      2) Sequence of operations.

      3) Status of submittals.

      4) Status of LEED for Homes documentation.

      5) Deliveries.

      6) Off-site fabrication.

      7) Access.

      8) Site utilization.

      9) Temporary facilities and controls.

      10) Progress cleaning.

      11) Quality and work standards.

      12) Status of correction of deficient items.
13) Field observations.
14) Status of RFIs.
15) Status of proposal requests.
16) Pending changes.
17) Status of Change Orders.
18) Pending claims and disputes.
19) Documentation of information for payment requests.

3. Minutes: Contractor responsible for conducting the meeting and will record and distribute the meeting minutes to each party present and to parties requiring information.
   a. Schedule Updating: Revise Contractor's construction schedule after each progress meeting where revisions to the schedule have been made or recognized. Issue revised schedule concurrently with the report of each meeting.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 3100
SECTION 01 3200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:
   1. Contractor’s construction schedule.
   2. Construction schedule updating reports.
   3. Daily construction reports.
   4. Site condition reports.

1.2 DEFINITIONS
A. Activity: A discrete part of a project that can be identified for planning, scheduling, monitoring, and controlling the construction project. Activities included in a construction schedule consume time and resources.
   1. Critical Activity: An activity on the critical path that must start and finish on the planned early start and finish times.
   2. Predecessor Activity: An activity that precedes another activity in the network.
   3. Successor Activity: An activity that follows another activity in the network.

1.3 INFORMATIONAL SUBMITTALS
A. Format for Submittals: Submit required submittals in the following format:
   1. Working electronic copy of schedule file, where indicated.
   2. PDF electronic file.
   3. Two (2) paper copies.
B. Startup Network Diagram: Of size required to display entire network for entire construction period. Show logic ties for activities.
C. Contractor’s Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.
D. Construction Schedule Updating Reports: Submit with Applications for Payment.
E. Daily Construction Reports: Submit at weekly intervals.
F. Site Condition Reports: Submit at time of discovery of differing conditions.

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

PART 2 - PRODUCTS

2.1 CONTRACTOR'S CONSTRUCTION SCHEDULE, GENERAL

A. Time Frame: Extend schedule from date established for the Notice to Proceed to date of final completion.
   1. Contract completion date shall not be changed by submission of a schedule that shows an early completion date, unless specifically authorized by Change Order.

B. Activities: Comply with the following:
   1. Activity Duration: Define activities so no activity is longer than 20 days, unless specifically allowed by Architect.
   2. Submittal Review Time: Include review and resubmittal times indicated in Section 01 3300 "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
   3. Startup and Testing Time: Include no fewer than fifteen (15) days for startup and testing.
   4. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
   5. Punch List and Final Completion: Include not more than thirty (30) days for completion of punch list items and final completion.

C. Constraints: Include constraints and work restrictions indicated in the Contract Documents and as follows in schedule, and show how the sequence of the Work is affected.
   1. Work Restrictions: Show the effect of the following items on the schedule:
      a. Uninterruptible services.
      b. Seasonal variations.
      c. Environmental control.
   2. Work Stages: Indicate important stages of construction for each major portion of the Work.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion, and the following interim milestones:
   1. Completion of foundation insulation and Radon system
   2. 2 days prior to insulation installation for thermal bypass inspection
3. Completion of insulation

E. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:
1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.

F. Recovery Schedule: When periodic update indicates the Work is 14 or more calendar days behind the current approved schedule, submit a separate recovery schedule indicating means by which Contractor intends to regain compliance with the schedule.

G. Computer Scheduling Software: Prepare schedules using current version of a program that has been developed specifically to manage construction schedules.

2.2 CONTRACTOR’S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within thirty (30) days of date established for Notice to Proceed, but no later than the first application for payment.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line.
   1. For construction activities that require three months or longer to complete, indicate an estimated completion percentage in 10 percent increments within time bar.

2.3 REPORTS

A. Daily Construction Reports: Prepare a daily construction report recording the following information concerning events at Project site:
   1. List of subcontractors at Project site.
   2. List of separate contractors at Project site.
   3. Approximate count of personnel at Project site.
   4. Equipment at Project site.
   5. Material deliveries.
   6. High and low temperatures and general weather conditions, including presence of rain or snow.
   7. Accidents.
   8. Meetings and significant decisions.
   9. Unusual events.
   10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Change Directives received and implemented.
16. Services connected and disconnected.
17. Equipment or system tests and startups.
18. Partial completions and occupancies.
19. Substantial Completions authorized.

B. Site Condition Reports: Immediately on discovery of a difference between site conditions and the Contract Documents, prepare and submit a detailed report. Submit with a Request for Information. Include a detailed description of the differing conditions, together with recommendations for changing the Contract Documents.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At biweekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule one week before each regularly scheduled progress meeting.

1. Revise schedule immediately after each meeting or other activity where revisions have been recognized or made. Issue updated schedule concurrently with the report of each such meeting.

2. Include a report with updated schedule that indicates every change, including, but not limited to, changes in logic, durations, actual starts and finishes, and activity durations.

3. As the Work progresses, indicate final completion percentage for each activity.

B. Distribution: Distribute copies of approved schedule to Architect, Owner, separate contractors, testing and inspecting agencies, and other parties identified by Contractor with a need-to-know schedule responsibility.

1. Post copies in Project meeting rooms and temporary field offices.

2. When revisions are made, distribute updated schedules to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in performance of construction activities.

END OF SECTION 01 3200
SECTION 01 3233 - PHOTOGRAPHIC DOCUMENTATION

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes administrative and procedural requirements for the following:
   1. Preconstruction photographs.
   2. Periodic construction photographs.
B. Related Requirements:
   1. Section 01 7700 "Closeout Procedures" for submitting photographic documentation as Project Record Documents at Project closeout.

1.2 INFORMATIONAL SUBMITTALS
A. Key Plan: Submit key plan of Project site and building with notation of vantage points marked for location and direction of each photograph/video recording. Indicate elevation or story of construction. Include same information as corresponding photographic documentation.
B. Digital Photographs: Submit unaltered, original, full-size image files within three (3) days of taking photographs.
   1. Digital Camera: Minimum sensor resolution of eight (8) megapixels.
   2. Identification: Provide the following information with each image description in file metadata tag:
      a. Name of Project.
      b. Name and contact information for photographer.
      c. Date photograph was taken.
      d. Description of vantage point, indicating location, direction (by compass point), and elevation or story of construction.

PART 2 - PRODUCTS

2.1 PHOTOGRAPHIC MEDIA
A. Digital Images: Provide images in JPG format, with minimum size of eight (8) megapixels.
PART 3 - EXECUTION

3.1 CONSTRUCTION PHOTOGRAPHS

A. General: Take color photographs using the maximum range of depth of field, and that are in focus, to clearly show the Work. Photographs with blurry or out-of-focus areas will not be accepted.
   1. Identify each photographic location – recommendation is to indicate vantage on a key plan.

B. Digital Images: Submit digital images exactly as originally recorded in the digital camera, without alteration, manipulation, editing, or modifications using image-editing software.
   1. Date and Time: Include date and time in file name for each image.
   2. Field Office Images: Maintain one set of images accessible in the field office at Project site, available at all times for reference. Identify images in the same manner as those submitted to Architect.

C. Preconstruction Photographs: Before commencement of demolition, take photographs of Project site and surrounding properties, including existing items to remain during construction, from different vantage points, as directed by Architect.
   1. Flag excavation areas before taking construction photographs.
   2. Take a minimum of twenty (20) photographs to show existing conditions adjacent to property before starting the Work.
   3. Take a minimum of twenty (20) photographs of existing buildings either on or adjoining property to accurately record physical conditions at start of construction.

D. Periodic Construction Photographs: Take a minimum of twenty (20) photographs weekly with the cutoff date associated with each Application for Payment. Select vantage points to show status of construction and progress since last photographs were taken.

E. Final Completion Construction Photographs: Take a minimum of twenty (20) photographs after date of Substantial Completion for submission as Project Record Documents. Architect will inform photographer of desired vantage points.

F. Additional Photographs: Architect or Owner may request photographs in addition to periodic photographs specified. Additional photographs will be paid for by Change Order and are not included in the Contract Sum.
   1. Three days' notice will be given, where feasible.
   2. In emergency situations, take additional photographs within 24 hours of request.
   3. Circumstances that could require additional photographs include, but are not limited to, the following:
      a. Special events planned at Project site.
      b. Immediate follow-up when on-site events result in construction damage or losses.
      c. Photographs to be taken at fabrication locations away from Project site. These photographs are not subject to unit prices or unit-cost allowances.
d. Substantial Completion of a major phase or component of the Work.

e. Extra record photographs at time of final acceptance.

END OF SECTION 01 3233
PART 1 - GENERAL

1.1 SUMMARY
A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.
B. Related Requirements:
   1. Section 01 3200 "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
   2. Section 01 7823 "Operation and Maintenance Data" for submitting operation and maintenance manuals.
   3. Section 01 7839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
   4. Section 01 7900 "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.2 DEFINITIONS
A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action.
B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements.

1.3 ACTION SUBMITTALS
A. Submittal Schedule: Submit a schedule of submittals, arranged in chronological order by dates required by construction schedule. Include time required for review, ordering, manufacturing, fabrication, and delivery when establishing dates. Include additional time required for making corrections or revisions to submittals noted by Architect and additional time for handling and reviewing submittals required by those corrections.

1.4 SUBMITTAL ADMINISTRATIVE REQUIREMENTS
A. Architect's Digital Data Files: Electronic copies of digital data files of the Contract Drawings will not be provided by Architect for Contractor's use in preparing submittals.
B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.
   1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
   2. Coordinate transmittal of different types of submittals for related parts of the Work so processing will not be delayed because of need to review submittals concurrently for coordination.
a. Architect reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

C. Processing Time: Allow time for submittal review, including time for resubmittals, as follows. Time for review shall commence on Architect’s receipt of submittal. No extension of the Contract Time will be authorized because of failure to transmit submittals enough in advance of the Work to permit processing, including resubmittals.

1. Initial Review: Allow fifteen (15) days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.

2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.

3. Resubmittal Review: Allow fifteen (15) days for review of each resubmittal.

D. Paper Submittals: Place a permanent label or title block on each submittal item for identification.

1. Indicate name of firm or entity that prepared each submittal on label or title block.

2. Provide a space approximately 6 by 8 inches (150 by 200 mm) on label or beside title block to record Contractor’s review and approval markings and action taken by Architect.

3. Include the following information for processing and recording action taken:
   a. Project name.
   b. Date.
   c. Name of Architect.
   d. Name of Construction Manager.
   e. Name of Contractor.
   f. Name of subcontractor.
   g. Name of supplier.
   h. Name of manufacturer.
   i. Submittal number or other unique identifier, including revision identifier.
      1) Submittal number shall use Specification Section number followed by a decimal point and then a sequential number (e.g., 061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., 061000.01.A).
   j. Number and title of appropriate Specification Section.
   k. Drawing number and detail references, as appropriate.
   l. Location(s) where product is to be installed, as appropriate.
   m. Other necessary identification.
4. Additional Paper Copies: Unless additional copies are required for final submittal, and unless Architect observes noncompliance with provisions in the Contract Documents, initial submittal may serve as final submittal.
   a. Submit one copy of submittal to concurrent reviewer in addition to specified number of copies to Architect.

5. Transmittal for Paper Submittals: Assemble each submittal individually and appropriately for transmittal and handling. Transmit each submittal using a transmittal form. Architect will not accept submittals received from sources other than Contractor.
   b. Transmittal Form for Paper Submittals: Provide locations on form for the following information:
      1) Project name.
      2) Date.
      3) Destination (To:).
      4) Source (From:).
      5) Name and address of Architect.
      6) Name of Construction Manager.
      7) Name of Contractor.
      8) Name of firm or entity that prepared submittal.
      9) Names of subcontractor, manufacturer, and supplier.
      10) Category and type of submittal.
      11) Submittal purpose and description.
      12) Specification Section number and title.
      13) Specification paragraph number or drawing designation and generic name for each of multiple items.
      14) Drawing number and detail references, as appropriate.
      15) Indication of full or partial submittal.
      16) Transmittal number, numbered consecutively.
      17) Submittal and transmittal distribution record.
      18) Remarks.
      19) Signature of transmitter.

E. Electronic Submittals: Identify and incorporate information in each electronic submittal file as follows:
   1. Assemble complete submittal package into a single indexed file incorporating submittal requirements of a single Specification Section and transmittal form with links enabling navigation to each item.
2. Name file with submittal number or other unique identifier, including revision identifier.
   a. File name shall use project identifier and Specification Section number followed by a decimal point and then a sequential number (e.g., Platinum-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., Platinum-061000.01.A).

3. Provide means for insertion to permanently record Contractor's review and approval markings and action taken by Architect.

4. Transmittal Form for Electronic Submittals: Use electronic form acceptable to Owner, containing the following information:
   a. Project name.
   b. Date.
   c. Name and address of Architect.
   d. Name of Construction Manager.
   e. Name of Contractor.
   f. Name of firm or entity that prepared submittal.
   g. Names of subcontractor, manufacturer, and supplier.
   h. Category and type of submittal.
   i. Submittal purpose and description.
   j. Specification Section number and title.
   k. Specification paragraph number or drawing designation and generic name for each of multiple items.
   l. Drawing number and detail references, as appropriate.
   m. Location(s) where product is to be installed, as appropriate.
   n. Related physical samples submitted directly.
   o. Indication of full or partial submittal.
   p. Transmittal number[, numbered consecutively].
   q. Submittal and transmittal distribution record.
   r. Other necessary identification.
   s. Remarks.

5. Metadata: Include the following information as keywords in the electronic submittal file metadata:
   a. Project name.
   b. Number and title of appropriate Specification Section.
   c. Manufacturer name.
   d. Product name.
F. Options: Identify options requiring selection by Architect.

G. Deviations: Identify deviations from the Contract Documents on submittals.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.
   1. Note date and content of previous submittal.
   2. Note date and content of revision in label or title block and clearly indicate extent of revision.
   3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

I. Distribution: Furnish copies of final submittals to manufacturers, subcontractors, suppliers, fabricators, installers, authorities having jurisdiction, and others as necessary for performance of construction activities. Show distribution on transmittal forms.

J. Use for Construction: Retain complete copies of submittals on Project site. Use only final action submittals that are marked with approval notation from Architect's action stamp.

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements:
   1. Post submittals electronically as PDF files directly to Project FTP site specifically established for Project.
      a. Inform Architect via email upon successful posting of submittal(s) to FTP site.
      c. Provide a digital signature with digital certificate on electronically-submitted certificates and certifications where indicated
   2. Submittals requiring a format larger than standard 8-1/2”x11” or 11”x17” or documents that can not be issued electronically may be submitted as a hardcopy paper format and shall be submitted as outlined below.
      a. Action Submittals: Submit three (3) paper copies of each submittal unless otherwise indicated. Architect will return two (2) copies.
      b. Informational Submittals: Submit two (2) paper copies of each submittal unless otherwise indicated. Architect will not return copies.
      c. Certificates and Certifications Submittals: Provide a statement that includes signature of entity responsible for preparing certification. Certificates and certifications shall be signed by an officer or other individual authorized to sign documents on behalf of that entity.
      d. Provide a notarized statement on original paper copy certificates and certifications where indicated.
B. Product Data: Collect information into a single submittal for each element of construction and type of product or equipment.

1. If information must be specially prepared for submittal because standard published data are not suitable for use, submit as Shop Drawings, not as Product Data.

2. Mark each copy of each submittal to show which products and options are applicable.

3. Include the following information, as applicable:
   a. Manufacturer's catalog cuts.
   b. Manufacturer's product specifications.
   c. Standard color charts.
   d. Statement of compliance with specified referenced standards.
   e. Testing by recognized testing agency.
   f. Application of testing agency labels and seals.
   g. Notation of coordination requirements.
   h. Availability and delivery time information.

4. For equipment, include the following in addition to the above, as applicable:
   a. Wiring diagrams showing factory-installed wiring.
   b. Printed performance curves.
   c. Operational range diagrams.
   d. Clearances required to other construction, if not indicated on accompanying Shop Drawings.

5. Submit Product Data before or concurrent with Samples.

C. Shop Drawings: Prepare Project-specific information, drawn accurately to scale. Do not base Shop Drawings on reproductions of the Contract Documents or standard printed data.

1. Preparation: Fully illustrate requirements in the Contract Documents. Include the following information, as applicable:
   a. Identification of products.
   b. Schedules.
   c. Compliance with specified standards.
   d. Notation of coordination requirements.
   e. Notation of dimensions established by field measurement.
   f. Relationship and attachment to adjoining construction clearly indicated.
   g. Seal and signature of professional engineer if specified.

2. Sheet Size: Except for templates, patterns, and similar full-size drawings, submit Shop Drawings on sheets at least **8-1/2 by 11 inches (215 by 280 mm)**, but no larger than **30 by 42 inches (750 by 1067 mm)**.

3. Submit Shop Drawings in the following format:
a. Two (2) Opaque (bond) copies of each submittal. Architect will return a scan of original document.

D. Samples: Submit Samples for review of kind, color, pattern, and texture for a check of these characteristics with other elements and for a comparison of these characteristics between submittal and actual component as delivered and installed.

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.

2. Identification: Attach label on unexposed side of Samples that includes the following:
   a. Generic description of Sample.
   b. Product name and name of manufacturer.
   c. Sample source.
   d. Number and title of applicable Specification Section.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.

4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.
   a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
   b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.
   a. Number of Samples: Submit one (1) full set of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.
   a. Number of Samples: Submit three (3) sets of Samples. Architect will retain two (2) Sample sets; remainder will be returned. [Mark up and retain one returned Sample set as a project record sample.]
1) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three (3) sets of paired units that show approximate limits of variations.

E. Product Schedule: As required in individual Specification Sections, prepare a written summary indicating types of products required for the Work and their intended location. Include the following information in tabular form:

1. Submit product schedule in the following format:
   a. PDF electronic file.

F. Coordination Drawings Submittals: Comply with requirements specified in Section 01 3100 "Project Management and Coordination."

G. Contractor's Construction Schedule: Comply with requirements specified in Section 01 3200 "Construction Progress Documentation."

H. Application for Payment and Schedule of Values: Comply with requirements specified in Section 01 2900 "Payment Procedures."

I. Test and Inspection Reports and Schedule of Tests and Inspections Submittals: Comply with requirements specified in Section 01 4000 "Quality Requirements."

J. Closeout Submittals and Maintenance Material Submittals: Comply with requirements specified in Section 01 7700 "Closeout Procedures."

K. Maintenance Data: Comply with requirements specified in Section 01 7823 "Operation and Maintenance Data."

L. Qualification Data: Prepare written information that demonstrates capabilities and experience of firm or person. Include lists of completed projects with project names and addresses, contact information of architects and owners, and other information specified.

M. Welding Certificates: Prepare written certification that welding procedures and personnel comply with requirements in the Contract Documents. Submit record of Welding Procedure Specification and Procedure Qualification Record on AWS forms. Include names of firms and personnel certified.

N. Installer Certificates: Submit written statements on manufacturer's letterhead certifying that Installer complies with requirements in the Contract Documents and, where required, is authorized by manufacturer for this specific Project.

O. Manufacturer Certificates: Submit written statements on manufacturer's letterhead certifying that manufacturer complies with requirements in the Contract Documents. Include evidence of manufacturing experience where required.

P. Product Certificates: Submit written statements on manufacturer's letterhead certifying that product complies with requirements in the Contract Documents.

Q. Material Certificates: Submit written statements on manufacturer's letterhead certifying that material complies with requirements in the Contract Documents.

R. Material Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting test results of material for compliance with requirements in the Contract Documents.
S. Product Test Reports: Submit written reports indicating that current product produced by manufacturer complies with requirements in the Contract Documents. Base reports on evaluation of tests performed by manufacturer and witnessed by a qualified testing agency, or on comprehensive tests performed by a qualified testing agency.

T. Research Reports: Submit written evidence, from a model code organization acceptable to authorities having jurisdiction, that product complies with building code in effect for Project.

U. Schedule of Tests and Inspections: Comply with requirements specified in Section 01 4000 "Quality Requirements."

V. Preconstruction Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of tests performed before installation of product, for compliance with performance requirements in the Contract Documents.

W. Compatibility Test Reports: Submit reports written by a qualified testing agency, on testing agency's standard form, indicating and interpreting results of compatibility tests performed before installation of product. Include written recommendations for primers and substrate preparation needed for adhesion.

X. Field Test Reports: Submit written reports indicating and interpreting results of field tests performed either during installation of product or after product is installed in its final location, for compliance with requirements in the Contract Documents.

Y. Design Data: Prepare and submit written and graphic information, including, but not limited to, performance and design criteria, list of applicable codes and regulations, and calculations. Include list of assumptions and other performance and design criteria and a summary of loads. Include load diagrams if applicable. Provide name and version of software, if any, used for calculations. Include page numbers.

2.2 DELEGATED-DESIGN SERVICES

A. Performance and Design Criteria: Where professional design services or certifications by a design professional are specifically required of Contractor by the Contract Documents, provide products and systems complying with specific performance and design criteria indicated.

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

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic files of certificate, signed and sealed by the responsible design professional, for each product and system specifically assigned to Contractor to be designed or certified by a design professional.

1. Indicate that products and systems comply with performance and design criteria in the Contract Documents. Include list of codes, loads, and other factors used in performing these services.
PART 3 - EXECUTION

3.1 CONTRACTOR'S REVIEW
   A. Action and Informational Submittals: Review each submittal and check for coordination with other Work of the Contract and for compliance with the Contract Documents. Note corrections and field dimensions. Mark with approval stamp before submitting to Architect.
   B. Project Closeout and Maintenance Material Submittals: See requirements in Section 01 7700 "Closeout Procedures."
   C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION
   A. General: Architect will not review submittals that do not bear Contractor's approval stamp and will return them without action.
   B. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.
   C. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.
   D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.
   E. Submittals not required by the Contract Documents may not be reviewed and may be discarded.

END OF SECTION 01 3300
PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for quality assurance and quality control.

B. Testing and inspecting services are required to verify compliance with requirements specified or indicated. These services do not relieve Contractor of responsibility for compliance with the Contract Document requirements.

1. Specified tests, inspections, and related actions do not limit Contractor’s other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.

2. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, LEED for Homes Provider, or authorities having jurisdiction are not limited by provisions of this Section.

3. Specific test and inspection requirements are not specified in this Section.

1.2 DEFINITIONS

A. Quality-Assurance Services: Activities, actions, and procedures performed before and during execution of the Work to guard against defects and deficiencies and substantiate that proposed construction will comply with requirements.

B. Quality-Control Services: Tests, inspections, procedures, and related actions during and after execution of the Work to evaluate that actual products incorporated into the Work and completed construction comply with requirements. Services do not include contract enforcement activities performed by Architect.

C. Mockups: Full-size physical assemblies that are constructed on-site. Mockups are constructed to verify selections made under Sample submittals; to demonstrate aesthetic effects and, where indicated, qualities of materials and execution; to review coordination, testing, or operation; to show interface between dissimilar materials; and to demonstrate compliance with specified installation tolerances. Mockups are not Samples. Unless otherwise indicated, approved mockups establish the standard by which the Work will be judged.

D. Preconstruction Testing: Tests and inspections performed specifically for Project before products and materials are incorporated into the Work, to verify performance or compliance with specified criteria.

E. Source Quality-Control Testing: Tests and inspections that are performed at the source, e.g., plant, mill, factory, or shop.

F. Field Quality-Control Testing: Tests and inspections that are performed on-site for installation of the Work and for completed Work.

G. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.
H. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. Use of trade-specific terminology in referring to a trade or entity does not require that certain construction activities be performed by accredited or unionized individuals, or that requirements specified apply exclusively to specific trade(s).

I. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five (5) previous projects similar in nature, size, and extent to this Project; being familiar with special requirements indicated; and having complied with requirements of authorities having jurisdiction.

1.3 CONFLICTING REQUIREMENTS

A. Referenced Standards: If compliance with two or more standards is specified and the standards establish different or conflicting requirements for minimum quantities or quality levels, comply with the most stringent requirement. Refer conflicting requirements that are different, but apparently equal, to Architect for a decision before proceeding.

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

1.4 INFORMATIONAL SUBMITTALS

A. Contractor's Statement of Responsibility: When required by authorities having jurisdiction, submit copy of written statement of responsibility sent to authorities having jurisdiction before starting work on the systems affected.

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

1.5 REPORTS AND DOCUMENTS

A. Test and Inspection Reports: Prepare and submit certified written reports specified in other Sections. Include the following:

1. Date of issue.
2. Project title and number.
3. Name, address, and telephone number of testing agency.
4. Dates and locations of samples and tests or inspections.
5. Names of individuals making tests and inspections.
6. Description of the Work and test and inspection method.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.
10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Field Reports: Prepare written information documenting tests and inspections specified in other Sections. Include the following:
   1. Name, address, and telephone number of representative making report.
   2. Statement on condition of substrates and their acceptability for installation of product.
   3. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
   4. Results of operational and other tests and a statement of whether observed performance complies with requirements.
   5. Other required items indicated in individual Specification Sections.

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

1.6 QUALITY ASSURANCE

A. General: Qualifications paragraphs in this article establish the minimum qualification levels required; individual Specification Sections specify additional requirements.

B. Manufacturer Qualifications: A firm experienced in manufacturing products or systems similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

C. Fabricator Qualifications: A firm experienced in producing products similar to those indicated for this Project and with a record of successful in-service performance, as well as sufficient production capacity to produce required units.

D. Installer Qualifications: A firm or individual experienced in installing, erecting, or assembling work similar in material, design, and extent to that indicated for this Project, whose work has resulted in construction with a record of successful in-service performance.

E. Professional Engineer Qualifications: A professional engineer who is legally qualified to practice in jurisdiction where Project is located and who is experienced in providing engineering services of the kind indicated. Engineering services are defined as those performed for installations of the system, assembly, or product that are similar in material, design, and extent to those indicated for this Project.
F. Specialists: Certain Specification Sections require that specific construction activities shall be performed by entities who are recognized experts in those operations. Specialists shall satisfy qualification requirements indicated and shall be engaged for the activities indicated.
   1. Requirements of authorities having jurisdiction shall supersede requirements for specialists.

G. Testing Agency Qualifications: An NRTL, an NVLAP, or an independent agency with the experience and capability to conduct testing and inspecting indicated, as documented according to ASTM E 329; and with additional qualifications specified in individual Sections; and, where required by authorities having jurisdiction, that is acceptable to authorities.

H. Manufacturer's Representative Qualifications: An authorized representative of manufacturer who is trained and approved by manufacturer to observe and inspect installation of manufacturer's products that are similar in material, design, and extent to those indicated for this Project.

I. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:
   1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
   2. Notify Architect seven (7) days in advance of dates and times when mockups will be constructed.
   3. Demonstrate the proposed range of aesthetic effects and workmanship.
   4. Obtain Architect's approval of mockups before starting work, fabrication, or construction.
      a. Allow seven (7) days for initial review and each re-review of each mockup.
   5. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
   6. Demolish and remove mockups when directed unless otherwise indicated.

1.7 QUALITY CONTROL

A. Owner Responsibilities: Where quality-control services are indicated as Owner's responsibility, Owner will engage a qualified testing agency to perform these services.
   1. Owner will furnish Contractor with names, addresses, and telephone numbers of testing agencies engaged and a description of types of testing and inspecting they are engaged to perform.
   2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor, and the Contract Sum will be adjusted by Change Order.

B. Contractor Responsibilities: Tests and inspections not explicitly assigned to Owner are Contractor's responsibility. Perform additional quality-control activities required to verify that the Work complies with requirements, whether specified or not.
1. Where services are indicated as Contractor's responsibility, engage a qualified testing agency to perform these quality-control services.
   a. Contractor shall not employ same entity engaged by Owner, unless agreed to in writing by Owner.

2. Notify testing agencies at least twenty-four (24) hours in advance of time when Work that requires testing or inspecting will be performed.

3. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.

4. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.

5. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a manufacturer's representative to observe and inspect the Work. Manufacturer's representative's services include examination of substrates and conditions, verification of materials, inspection of completed portions of the Work, and submittal of written reports.

D. Retesting/Reinspecting: Regardless of whether original tests or inspections were Contractor's responsibility, provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents.

   1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
   2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.
   3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
   4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
   5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
   6. Do not perform any duties of Contractor.

F. Associated Services: Cooperate with agencies performing required tests, inspections, and similar quality-control services, and provide reasonable auxiliary services as requested. Notify agency sufficiently in advance of operations to permit assignment of personnel. Provide the following:
   1. Access to the Work.
   2. Incidental labor and facilities necessary to facilitate tests and inspections.
   3. Adequate quantities of representative samples of materials that require testing and inspecting. Assist agency in obtaining samples.
4. Facilities for storage and field curing of test samples.
5. Delivery of samples to testing agencies.
6. Preliminary design mix proposed for use for material mixes that require control by testing agency.
7. Security and protection for samples and for testing and inspecting equipment at Project site.

G. Coordination: Coordinate sequence of activities to accommodate required quality-assurance and control services with a minimum of delay and to avoid necessity of removing and replacing construction to accommodate testing and inspecting.
1. Schedule times for tests, inspections, obtaining samples, and similar activities.

1.8 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Owner will engage a qualified testing agency to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner as follows:
1. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
2. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
3. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
4. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
5. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. Test and Inspection Log: Prepare a record of tests and inspections. Include the following:
1. Date test or inspection was conducted.
2. Description of the Work tested or inspected.
3. Date test or inspection results were transmitted to Architect.
4. Identification of testing agency or special inspector conducting test or inspection.

B. Maintain log at Project site. Post changes and revisions as they occur. Provide access to test and inspection log for Architect's reference during normal working hours.
3.2 REPAIR AND PROTECTION

A. General: On completion of testing, inspecting, sample taking, and similar services, repair damaged construction and restore substrates and finishes.

1. Provide materials and comply with installation requirements specified in other Specification Sections or matching existing substrates and finishes. Restore patched areas and extend restoration into adjoining areas with durable seams that are as invisible as possible. Comply with the Contract Document requirements for cutting and patching in Section 01 7300 "Execution."

B. Protect construction exposed by or for quality-control service activities.

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

END OF SECTION 01 4000
SECTION 01 4200 - REFERENCES

PART 1 - GENERAL

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

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

1.3 ABBREVIATIONS AND ACRONYMS
A. Industry Organizations: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.
7. ACI - American Concrete Institute; (Formerly: ACI International); www.concrete.org.
8. ACPA - American Concrete Pipe Association; www.concrete-pipe.org.
9. AEIC - Association of Edison Illuminating Companies, Inc. (The); www.aeic.org.
15. AIA - American Institute of Architects (The); www.aia.org.
25. ARI - Air-Conditioning & Refrigeration Institute; (See AHRI).
26. ARI - American Refrigeration Institute; (See AHRI).
28. ASCE - American Society of Civil Engineers; www.asce.org.
29. ASCE/SEI - American Society of Civil Engineers/Structural Engineering Institute; (See ASCE).
31. ASME - ASME International; (American Society of Mechanical Engineers); www.asme.org.
32. ASSE - American Society of Safety Engineers (The); www.asse.org.
42. BHMA - Builders Hardware Manufacturers Association; www.buildershardware.com.
43. BIA - Brick Industry Association (The); www.gobrick.com.
44. BICSI - BICSI, Inc.; www.bicsi.org.
45. BIFMA - BIFMA International; (Business and Institutional Furniture Manufacturer's Association); www.bifma.com.
46. BISSC - Baking Industry Sanitation Standards Committee; www.bissc.org.
47. BWF - Badminton World Federation; (Formerly: International Badminton Federation); www.bwfbadminton.org.
49. CEA - Canadian Electricity Association; www.electricity.ca.
50. CEA - Consumer Electronics Association; www.ce.org.
52. CFSEI - Cold-Formed Steel Engineers Institute; www.cfsei.org.
57. CLFMI - Chain Link Fence Manufacturers Institute; www.chainlinkinfo.org.
59. CRI - Carpet and Rug Institute (The); www.carpet-rug.org.
60. CRRC - Cool Roof Rating Council; www.coolroofs.org.
61. CRSI - Concrete Reinforcing Steel Institute; www.crsi.org.
62. CSA - Canadian Standards Association; www.csa.ca.
63. CSA - CSA International; (Formerly: IAS - International Approval Services); www.csa-international.org.
64. CSI - Construction Specifications Institute (The); www.csinet.org.
65. CSSB - Cedar Shake & Shingle Bureau; www.cedarbureau.org.
66. CTI - Cooling Technology Institute; (Formerly: Cooling Tower Institute); www.cti.org.
67. CWC - Composite Wood Council; (See CPA).
69. DHI - Door and Hardware Institute; www.dhi.org.
70. ECA - Electronic Components Association; (See ECIA).
71. ECAMA - Electronic Components Assemblies & Materials Association; (See ECIA).
73. EIA - Electronic Industries Alliance; (See TIA).
76. ESD - ESD Association; (Electrostatic Discharge Association); www.esda.org.
77. ESTA - Entertainment Services and Technology Association; (See PLASA).
79. FIBA - Fédération Internationale de Basketball; (The International Basketball Federation); www.fiba.com.
80. FIVB - Fédération Internationale de Volleyball; (The International Volleyball Federation); www.fivb.org.
82. FM Global - FM Global; (Formerly: FMG - FM Global); www.fmglobal.com.
86. GA - Gypsum Association; www.gypsum.org.
88. GS - Green Seal; www.greenseal.org.
89. HI - Hydraulic Institute; www.pumps.org.
90. HI/GAMA - Hydronics Institute/Gas Appliance Manufacturers Association; (See AHRI).
91. HMMA - Hollow Metal Manufacturers Association; (See NAAMM).
95. IAS - International Accreditation Service; www.iasonline.org.
96. IAS - International Approval Services; (See CSA).
97. ICBO - International Conference of Building Officials; (See ICC).
99. ICEA - Insulated Cable Engineers Association, Inc.; www.icea.net.
100. ICPA - International Cast Polymer Alliance; www.icpa-hq.org.
101. ICRI - International Concrete Repair Institute, Inc.; www.icri.org.
103. IEEE - Institute of Electrical and Electronics Engineers, Inc. (The); www.ieee.org.
104. IES - Illuminating Engineering Society; (Formerly: Illuminating Engineering Society of North America); www.ies.org.
105. IESNA - Illuminating Engineering Society of North America; (See IES).
106. IEST - Institute of Environmental Sciences and Technology; www.iest.org.
110. Intertek - Intertek Group; (Formerly: ETL SEMCO; Intertek Testing Service NA); www.intertek.com.
111. ISA - International Society of Automation (The); (Formerly: Instrumentation, Systems, and Automation Society); www.isa.org.
112. ISAS - Instrumentation, Systems, and Automation Society (The); (See ISA).
113. ISFA - International Surface Fabricators Association; (Formerly: International Solid Surface Fabricators Association); www.isfanow.org.
115. ISSFA - International Solid Surface Fabricators Association; (See ISFA).
116. ITU - International Telecommunication Union; www.itu.int/home.
117. KCMA - Kitchen Cabinet Manufacturers Association; www.kcma.org.
118. LMA - Laminating Materials Association; (See CPA).
120. MBMA - Metal Building Manufacturers Association; www.mbma.com.
121. MCA - Metal Construction Association; www.metalconstruction.org.
125. MIA - Marble Institute of America; www.marble-institute.com.
126. MMPA - Moulding & Millwork Producers Association; (Formerly: Wood Moulding & Millwork Producers Association); www.wmmpa.com.
130. NACE - NACE International; (National Association of Corrosion Engineers International); www.nace.org.
134. NCAA - National Collegiate Athletic Association (The); www.ncaa.org.
135. NCMA - National Concrete Masonry Association; www.ncma.org.
137. NECA - National Electrical Contractors Association; www.necanet.org.
139. NEMA - National Electrical Manufacturers Association; www.nema.org.
140. NETA - InterNational Electrical Testing Association; www.netaworld.org.
141. NFHS - National Federation of State High School Associations; www.nfhs.org.
143. NFPA - NFPA International; (See NFPA).
146. NLGA - National Lumber Grades Authority; www.nlga.org.
147. NOFMA - National Oak Flooring Manufacturers Association; (See NWFA).
149. NRCA - National Roofing Contractors Association; www.nrca.net.
150. NRMCA - National Ready Mixed Concrete Association; www.nrmca.org.
151. NSF - NSF International; (National Sanitation Foundation International); www.nsf.org.
152. NSPE - National Society of Professional Engineers; www.nspe.org.
156. PCI - Precast/Prestressed Concrete Institute; www pci.org.
157. PDI - Plumbing & Drainage Institute; www pdionline.org.
158. PLASA - PLASA; (Formerly: ESTA - Entertainment Services and Technology Association); www.plasa.org.
162. SAE - SAE International; (Society of Automotive Engineers); www.sae.org.
163. SCTE - Society of Cable Telecommunications Engineers; www.scte.org.
164. SDI - Steel Deck Institute; www.sdi.org.
165. SDI - Steel Door Institute; www.steeldoor.org.
167. SEI/ASCE - Structural Engineering Institute/American Society of Civil Engineers; (See ASCE).
170. SMA - Screen Manufacturers Association; www.smainfo.org.
171. SMACNA - Sheet Metal and Air Conditioning Contractors' National Association; www.smacna.org.
172. SMPTE - Society of Motion Picture and Television Engineers; www.smpte.org.
173. SPFA - Spray Polyurethane Foam Alliance; www.sprayfoam.org.
182. TCA - Tilt-Up Concrete Association; www.tilt-up.org.
185. TIA - Telecommunications Industry Association; (Formerly: TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance); www.tiaonline.org.

186. TIA/EIA - Telecommunications Industry Association/Electronic Industries Alliance; (See TIA).


188. TPI - Truss Plate Institute; www.tpinst.org.

189. TPI - Turfgrass Producers International; www.turfgrassod.org.

190. TRI - Tile Roofing Institute; (Formerly: National Tile Roofing Manufacturing Association); www.tileroofing.org.

191. UBC - Uniform Building Code; (See ICC).


194. USAV - USA Volleyball; www.usavolleyball.org.


198. WCLIB - West Coast Lumber Inspection Bureau; www.wclib.org.

199. WCMA - Window Covering Manufacturers Association; www.wcmanet.org.


201. WI - Woodwork Institute; (Formerly: WIC - Woodwork Institute of California); www.wicnet.org.

202. WMMPA - Wood Moulding & Millwork Producers Association; (See MMPA).


204. WPA - Western Wood Products Association; www.wwpa.org.

B. Code Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.


C. Federal Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. COE - Army Corps of Engineers; www.usace.army.mil.


3. DOC - Department of Commerce; National Institute of Standards and Technology; www.nist.gov.
5. DOE - Department of Energy; www.energy.gov.
6. EPA - Environmental Protection Agency; www.epa.gov.
7. FAA - Federal Aviation Administration; www.faa.gov.
11. LBL - Lawrence Berkeley National Laboratory; Environmental Energy Technologies Division; http://eetd.lbl.gov.
12. OSHA - Occupational Safety & Health Administration; www.osha.gov.
13. SD - Department of State; www.state.gov.
15. USDA - Department of Agriculture; Agriculture Research Service; U.S. Salinity Laboratory; www.ars.usda.gov.
16. USDA - Department of Agriculture; Rural Utilities Service; www.usda.gov.
17. USDJ - Department of Justice; Office of Justice Programs; National Institute of Justice; www.ojp.usdoj.gov.

D. State Government Agencies: Where abbreviations and acronyms are used in Specifications or other Contract Documents, they shall mean the recognized name of the entities in the following list.

1. CBHF; State of California; Department of Consumer Affairs; Bureau of Electronic Appliance and Repair, Home Furnishings and Thermal Insulation; www.bearhfti.ca.gov.
2. CCR; California Code of Regulations; Office of Administrative Law; California Title 24 Energy Code; www.calregs.com.
3. CDHS; California Department of Health Services; (See CDPH).
4. CDPH; California Department of Public Health; Indoor Air Quality Program; www.cal-iaq.org.
5. CPUC; California Public Utilities Commission; www.cpuc.ca.gov.
6. SCAQMD; South Coast Air Quality Management District; www.aqmd.gov.
7. TFS; Texas Forest Service; Forest Resource Development and Sustainable Forestry; http://txforestservice.tamu.edu.
PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 4200
SECTION 01 5000 - TEMPORARY FACILITIES AND CONTROLS

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes requirements for temporary utilities, support facilities, and security and protection facilities.
   B. Related Requirements:
      1. Section 01 1000 "Summary" for work restrictions and limitations on utility interruptions.

1.2 USE CHARGES
   A. General: Installation and removal of and use charges for temporary facilities shall be included in the Contract Sum unless otherwise indicated. Allow other entities to use temporary services and facilities without cost, including, but not limited to Architect, testing agencies, and authorities having jurisdiction.
   B. Water and Sewer Service from Existing System: Provide temporary connections, meters and extensions of services as required for construction operations.
   C. Electric Power Service from Existing System: Provide temporary connections, meters and extensions of services as required for construction operations from Owner provided power source.

1.3 INFORMATIONAL SUBMITTALS
   A. Site Plan: Show temporary facilities, utility hookups, staging areas, and parking areas for construction personnel.
   B. Erosion- and Sedimentation-Control Plan: Show compliance with requirements of EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.
   C. Fire-Safety Program: Show compliance with requirements of NFPA 241 and authorities having jurisdiction. Indicate Contractor personnel responsible for management of fire prevention program.

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

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

PART 2 - PRODUCTS

2.1 MATERIALS

A. Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 8 feet (2.4 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top rails.

B. Portable Chain-Link Fencing: Minimum 2-inch (50-mm), 0.148-inch- (3.8-mm-) thick, galvanized-steel, chain-link fabric fencing; minimum 6 feet (1.8 m) high with galvanized-steel pipe posts; minimum 2-3/8-inch- (60-mm-) OD line posts and 2-7/8-inch- (73-mm-) OD corner and pull posts, with 1-5/8-inch- (42-mm-) OD top and bottom rails. Provide concrete bases for supporting posts.

2.2 TEMPORARY FACILITIES

A. Field Offices, General: Prefabricated or mobile units with serviceable finishes, temperature controls, and foundations adequate for normal loading; Contractor may arrange with Owner to rent office space on adjoining property to serve as temporary facilities.

B. Common-Use Field Office: Of sufficient size to accommodate needs of Owner, Architect, and construction personnel office activities and to accommodate Project meetings specified in other Division 01 Sections. Keep office clean and orderly.

C. Storage and Fabrication Sheds: Provide sheds sized, furnished, and equipped to accommodate materials and equipment for construction operations.

2.3 EQUIPMENT

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

B. HVAC Equipment: Unless Owner authorizes use of permanent HVAC system, provide vented, self-contained, liquid-propane-gas or fuel-oil heaters with individual space thermostatic control.

1. Use of gasoline-burning space heaters, open-flame heaters, or salamander-type heating units is prohibited.

2. Heating Units: Listed and labeled for type of fuel being consumed, by a qualified testing agency acceptable to authorities having jurisdiction, and marked for intended location and application.

3. Permanent HVAC System: If Owner authorizes use of permanent HVAC system for temporary use during construction, provide filter with MERV of 8 at each return-air grille in system and remove at end of construction and clean HVAC system as required in Section 01 7700 "Closeout Procedures".
PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Locate facilities where they will serve Project adequately and result in minimum interference with performance of the Work. Relocate and modify facilities as required by progress of the Work.

B. Provide each facility ready for use when needed to avoid delay. Do not remove until facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

3.2 TEMPORARY UTILITY INSTALLATION

A. General: Install temporary service or connect to existing service.

1. Arrange with utility company, Owner, and existing users for time when service can be interrupted, if necessary, to make connections for temporary services.

B. Sewers and Drainage: Provide temporary utilities to remove effluent lawfully.

1. Connect temporary sewers to municipal system as directed by authorities having jurisdiction.

C. Water Service: Install water service and distribution piping in sizes and pressures adequate for construction.

D. Sanitary Facilities: Provide temporary toilets, wash facilities, and drinking water for use of construction personnel. Comply with requirements of authorities having jurisdiction for type, number, location, operation, and maintenance of fixtures and facilities.

E. Heating and Cooling: Provide temporary heating and cooling required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of low temperatures or high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed.

F. Ventilation and Humidity Control: Provide temporary ventilation required by construction activities for curing or drying of completed installations or for protecting installed construction from adverse effects of high humidity. Select equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce ambient condition required and minimize energy consumption.

G. Electric Power Service: Electric power service Owner provided (through PNM) and distribution system of sufficient size, capacity, and power characteristics required for construction operations.

1. Install electric power service underground underground unless otherwise indicated.

2. Connect temporary service to Owner's existing power source, as directed by Owner.

H. Lighting: Provide temporary lighting with local switching that provides adequate illumination for construction operations, observations, inspections, and traffic conditions.

1. Install and operate temporary lighting that fulfills security and protection requirements without operating entire system for construction operations only.

I. Telephone Service: Provide temporary telephone service in common-use facilities for use by all construction personnel. Install one (1) telephone line(s) for each field office.
1. Provide additional telephone lines for the following:
   a. Provide a dedicated telephone line for each facsimile machine in each field office.

2. At each telephone, post a list of important telephone numbers.
   a. Police and fire departments.
   b. Ambulance service.
   c. Contractor's home office.
   d. Contractor's emergency after-hours telephone number.
   e. Architect's office.
   f. Engineers' offices.
   g. Owner's office.
   h. Principal subcontractors' field and home offices.

3. Provide superintendent with cellular telephone or portable two-way radio for use when away from field office.

J. Electronic Communication Service: Provide access to a computer in the primary field office adequate for use by Architect and Owner to access project electronic documents and maintain electronic communications.

3.3 SUPPORT FACILITIES INSTALLATION

A. General: Comply with the following:
   1. Maintain support facilities until Architect schedules Substantial Completion inspection. Remove before Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to Owner.

B. Temporary Use of Permanent Roads and Paved Areas: Locate temporary roads and paved areas in same location as permanent roads and paved areas. Construct and maintain temporary roads and paved areas adequate for construction operations. Extend temporary roads and paved areas, within construction limits indicated, as necessary for construction operations.
   1. Coordinate elevations of temporary roads and paved areas with permanent roads and paved areas.
   2. Prepare subgrade and install subbase and base for temporary roads and paved areas according to Section 31 2000 "Earth Moving."
   3. Recondition base after temporary use, including removing contaminated material, regrading, proofrolling, compacting, and testing.
   4. Delay installation of final course of permanent hot-mix asphalt pavement until immediately before Substantial Completion. Repair hot-mix asphalt base-course pavement before installation of final course according to Section 32 1216 "Asphalt Paving."
C. Traffic Controls: Comply with requirements of authorities having jurisdiction.
   1. Protect existing site improvements to remain including curbs, pavement, and utilities.
   2. Maintain access for fire-fighting equipment and access to fire hydrants.

D. Parking: Use designated areas of Owner's existing parking areas for construction personnel.

E. Dewatering Facilities and Drains: Comply with requirements of authorities having jurisdiction. Maintain Project site, excavations, and construction free of water.
   1. Dispose of rainwater in a lawful manner that will not result in flooding Project or adjoining properties or endanger permanent Work or temporary facilities.
   2. Remove snow and ice as required to minimize accumulations.

F. Project Signs: Provide Project signs as indicated. Unauthorized signs are not permitted.
   1. Identification Signs: Provide Project identification signs – verify w/ Architect.
   2. Temporary Signs: Provide other signs as indicated and as required to inform public and individuals seeking entrance to Project.
      a. Provide temporary, directional signs for construction personnel and visitors.
   3. Maintain and touchup signs so they are legible at all times.

G. Waste Disposal Facilities: Comply with requirements specified in Section 01 7419 "Construction Waste Management and Disposal."

H. Waste Disposal Facilities: Provide waste-collection containers in sizes adequate to handle waste from construction operations. Comply with requirements of authorities having jurisdiction. Comply with progress cleaning requirements in Section 01 7300 "Execution."

I. Lifts and Hoists: Provide facilities necessary for hoisting materials and personnel.


K. Temporary Stairs: Until permanent stairs are available, provide temporary stairs where ladders are not adequate.

L. Temporary Use of Permanent Stairs: Use of new stairs for construction traffic will be permitted, provided stairs are protected and finishes restored to new condition at time of Substantial Completion.

3.4 SECURITY AND PROTECTION FACILITIES INSTALLATION

A. Protection of Existing Facilities: Protect existing vegetation, equipment, structures, utilities, and other improvements at Project site and on adjacent properties, except those indicated to be removed or altered. Repair damage to existing facilities.

B. Environmental Protection: Provide protection, operate temporary facilities, and conduct construction as required to comply with environmental regulations and that minimize possible air, waterway, and subsoil contamination or pollution or other undesirable effects.

C. Temporary Erosion and Sedimentation Control: Provide measures to prevent soil erosion and discharge of soil-bearing water runoff and airborne dust to undisturbed areas and to
adjacent properties and walkways, according to requirements of 2003 EPA Construction General Permit or authorities having jurisdiction, whichever is more stringent.

D. Stormwater Control: Comply with requirements of authorities having jurisdiction. Provide barriers in and around excavations and subgrade construction to prevent flooding by runoff of stormwater from heavy rains.

E. Tree and Plant Protection: Install temporary fencing located as indicated or outside the drip line of trees to protect vegetation from damage from construction operations. Protect tree root systems from damage, flooding, and erosion.

F. Pest Control: Engage pest-control service to recommend practices to minimize attraction and harboring of rodents, roaches, and other pests and to perform extermination and control procedures at regular intervals so Project will be free of pests and their residues at Substantial Completion. Perform control operations lawfully, using environmentally safe materials.

G. Site Enclosure Fence: Before construction operations begin, furnish and install site enclosure fence in a manner that will prevent people and animals from easily entering site except by entrance gates.

1. Extent of Fence: As required to enclose entire Project site or portion determined sufficient to accommodate construction operations.

H. Security Enclosure and Lockup: Install temporary enclosure around partially completed areas of construction. Provide lockable entrances to prevent unauthorized entrance, vandalism, theft, and similar violations of security. Lock entrances at end of each work day.

I. Barricades, Warning Signs, and Lights: Comply with requirements of authorities having jurisdiction for erecting structurally adequate barricades, including warning signs and lighting.

J. Temporary Egress: Maintain temporary egress from existing occupied facilities as indicated and as required by authorities having jurisdiction.

K. Temporary Enclosures: Provide temporary enclosures for protection of construction, in progress and completed, from exposure, foul weather, other construction operations, and similar activities. Provide temporary weathertight enclosure for building exterior.

1. Where heating or cooling is needed and permanent enclosure is not complete, insulate temporary enclosures.

L. Temporary Fire Protection: Install and maintain temporary fire-protection facilities of types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 241; manage fire prevention program.

1. Prohibit smoking in construction areas.

2. Supervise welding operations, combustion-type temporary heating units, and similar sources of fire ignition according to requirements of authorities having jurisdiction.

3. Develop and supervise an overall fire-prevention and -protection program for personnel at Project site. Review needs with local fire department and establish procedures to be followed. Instruct personnel in methods and procedures. Post warnings and information.

4. Provide for jobsite fire protection.
3.5 MOISTURE AND MOLD CONTROL


B. Exposed Construction Phase: Before installation of weather barriers, when materials are subject to wetting and exposure and to airborne mold spores, protect materials from water damage and keep porous and organic materials from coming into prolonged contact with concrete.

C. Partially Enclosed Construction Phase: After installation of weather barriers but before full enclosure and conditioning of building, when installed materials are still subject to infiltration of moisture and ambient mold spores, protect as follows:
   1. Do not load or install drywall or other porous materials or components, or items with high organic content, into partially enclosed building.
   2. Keep interior spaces reasonably clean and protected from water damage.
   3. Discard or replace water-damaged and wet material.
   4. Discard, replace, or clean stored or installed material that begins to grow mold.
   5. Perform work in a sequence that allows any wet materials adequate time to dry before enclosing the material in drywall or other interior finishes.

D. Controlled Construction Phase of Construction: After completing and sealing of the building enclosure but prior to the full operation of permanent HVAC systems, maintain as follows:
   1. Control moisture and humidity inside building by maintaining effective dry-in conditions.
   2. Remove materials that can not be completely restored to their manufactured moisture level within forty-eight (48) hours.

3.6 OPERATION, TERMINATION, AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. To minimize waste and abuse, limit availability of temporary facilities to essential and intended uses.

B. Maintenance: Maintain facilities in good operating condition until removal.
   1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation, and similar facilities on a 24-hour basis where required to achieve indicated results and to avoid possibility of damage.

C. Temporary Facility Changeover: Do not change over from using temporary security and protection facilities to permanent facilities until Substantial Completion.

D. Termination and Removal: Remove each temporary facility when need for its service has ended, when it has been replaced by authorized use of a permanent facility, or no later than Substantial Completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with temporary facility. Repair damaged Work, clean exposed surfaces, and replace construction that cannot be satisfactorily repaired.
   1. Materials and facilities that constitute temporary facilities are property of Contractor. Owner reserves right to take possession of Project identification signs.
2. At Substantial Completion, repair, renovate, and clean permanent facilities used during construction period. Comply with final cleaning requirements specified in Section 01 7700 "Closeout Procedures."

END OF SECTION 01 5000
SECTION 01 6000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Requirements:
   1. Section 01 2500 “Substitution Procedures” for requests for substitutions.

1.2 DEFINITIONS

A. Products: Items obtained for incorporating into the Work, whether purchased for Project or taken from previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and terms of similar intent.

1. Named Products: Items identified by manufacturer's product name, including make or model number or other designation shown or listed in manufacturer's published product literature, that is current as of date of the Contract Documents.

2. New Products: Items that have not previously been incorporated into another project or facility. Products salvaged or recycled from other projects are not considered new products.

3. Comparable Product: Product that is demonstrated and approved through submittal process to have the indicated qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics that equal or exceed those of specified product.

B. Basis-of-Design Product Specification: A specification in which a specific manufacturer's product is named and accompanied by the words "basis-of-design product," including make or model number or other designation, to establish the significant qualities related to type, function, dimension, in-service performance, physical properties, appearance, and other characteristics for purposes of evaluating comparable products of additional manufacturers named in the specification.

1.3 ACTION SUBMITTALS

A. Comparable Product Requests: Submit request for consideration of each comparable product. Identify product or fabrication or installation method to be replaced. Include Specification Section number and title and Drawing numbers and titles.

1. Architect's Action: If necessary, Architect will request additional information or documentation for evaluation within one week of receipt of a comparable product request. Architect will notify Contractor of approval or rejection of proposed comparable product request within fifteen (15) days of receipt of request, or seven (7) days of receipt of additional information or documentation, whichever is later.

   a. Form of Approval: As specified in Section 01 3300 "Submittal Procedures."
b. Use product specified if Architect does not issue a decision on use of a comparable product request within time allocated.

B. Basis-of-Design Product Specification Submittal: Comply with requirements in Section 01 3300 "Submittal Procedures." Show compliance with requirements.

1.4 QUALITY ASSURANCE

A. Compatibility of Options: If Contractor is given option of selecting between two or more products for use on Project, select product compatible with products previously selected, even if previously selected products were also options.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle products using means and methods that will prevent damage, deterioration, and loss, including theft and vandalism. Comply with manufacturer's written instructions.

B. Delivery and Handling:

1. Schedule delivery to minimize long-term storage at Project site and to prevent overcrowding of construction spaces.

2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other losses.

3. Deliver products to Project site in an undamaged condition in manufacturer's original sealed container or other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting, and installing.

4. Inspect products on delivery to determine compliance with the Contract Documents and to determine that products are undamaged and properly protected.

C. Storage:

1. Store products to allow for inspection and measurement of quantity or counting of units.

2. Store materials in a manner that will not endanger Project structure.

3. Store products that are subject to damage by the elements, under cover in a weathertight enclosure above ground, with ventilation adequate to prevent condensation.

4. Protect foam plastic from exposure to sunlight, except to extent necessary for period of installation and concealment.

5. Comply with product manufacturer's written instructions for temperature, humidity, ventilation, and weather-protection requirements for storage.

6. Protect stored products from damage and liquids from freezing.

1.6 PRODUCT WARRANTIES

A. Warranties specified in other Sections shall be in addition to, and run concurrent with, other warranties required by the Contract Documents. Manufacturer's disclaimers and limitations
on product warranties do not relieve Contractor of obligations under requirements of the Contract Documents.

1. Manufacturer's Warranty: Written warranty furnished by individual manufacturer for a particular product and specifically endorsed by manufacturer to Owner.

2. Special Warranty: Written warranty required by the Contract Documents to provide specific rights for Owner.

B. Special Warranties: Prepare a written document that contains appropriate terms and identification, ready for execution.
   1. Manufacturer's Standard Form: Modified to include Project-specific information and properly executed.
   2. Specified Form: When specified forms are included with the Specifications, prepare a written document using indicated form properly executed.
   3. Refer to other Sections for specific content requirements and particular requirements for submitting special warranties.

C. Submittal Time: Comply with requirements in Section 01 7700 "Closeout Procedures."

PART 2 - PRODUCTS

2.1 PRODUCT SELECTION PROCEDURES

A. General Product Requirements: Provide products that comply with the Contract Documents, are undamaged and, unless otherwise indicated, are new at time of installation.
   1. Provide products complete with accessories, trim, finish, fasteners, and other items needed for a complete installation and indicated use and effect.
   2. Standard Products: If available, and unless custom products or nonstandard options are specified, provide standard products of types that have been produced and used successfully in similar situations on other projects.
   3. Owner reserves the right to limit selection to products with warranties not in conflict with requirements of the Contract Documents.
   4. Where products are accompanied by the term "as selected," Architect will make selection.

B. Product Selection Procedures:
   1. Manufacturer/Source: Where Specifications name a single manufacturer or source, provide a product by the named manufacturer or source that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered.
   2. Products:
      a. Restricted List: Where Specifications include a list of names of both manufacturers and products, provide one of the products listed that complies
with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.

3. Manufacturers:
   a. Restricted List: Where Specifications include a list of manufacturers' names, provide a product by one of the manufacturers listed that complies with requirements. Comparable products or substitutions for Contractor's convenience will not be considered unless otherwise indicated.

4. Basis-of-Design Product: Where Specifications name a product, or refer to a product indicated on Drawings, and include a list of manufacturers, provide the specified or indicated product or a comparable product by one of the other named manufacturers. Drawings and Specifications indicate sizes, profiles, dimensions, and other characteristics that are based on the product named. Comply with requirements in "Comparable Products" Article for consideration of an unnamed product by one of the other named manufacturers.

C. Visual Matching Specification: Where Specifications require "match Architect's sample", provide a product that complies with requirements and matches Architect's sample. Architect's decision will be final on whether a proposed product matches.

1. If no product available within specified category matches and complies with other specified requirements, comply with requirements in Section 01 2500 "Substitution Procedures" for proposal of product.

D. Visual Selection Specification: Where Specifications include the phrase "as selected by Architect from manufacturer's full range" or similar phrase, select a product that complies with requirements. Architect will select color, gloss, pattern, density, or texture from manufacturer's product line that includes both standard and premium items.

2.2 COMPARABLE PRODUCTS

A. Conditions for Consideration: Architect will consider Contractor's request for comparable product when the following conditions are satisfied. If the following conditions are not satisfied, Architect may return requests without action, except to record noncompliance with these requirements:

1. Evidence that the proposed product does not require revisions to the Contract Documents, that it is consistent with the Contract Documents and will produce the indicated results, and that it is compatible with other portions of the Work.

2. Detailed comparison of significant qualities of proposed product with those named in the Specifications. Significant qualities include attributes such as performance, weight, size, durability, visual effect, and specific features and requirements indicated.

3. Evidence that proposed product provides specified warranty.

4. List of similar installations for completed projects with project names and addresses and names and addresses of architects and owners, if requested.

5. Samples, if requested.

PART 3 - EXECUTION (Not Used)

END OF SECTION 01 6000

PRODUCT REQUIREMENTS
SECTION 01 7300 - EXECUTION

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes general administrative and procedural requirements governing execution of the Work including, but not limited to, the following:
   2. Field engineering and surveying.
   3. Installation of the Work.
   4. Cutting and patching.
   5. Coordination of Owner-installed products.
   6. Progress cleaning.
   7. Starting and adjusting.
   8. Protection of installed construction.

B. Related Requirements:
   1. Section 01 1000 “Summary” for limits on use of Project site.
   2. Section 01 7700 “Closeout Procedures” for submitting final property survey with Project Record Documents, recording of Owner-accepted deviations from indicated lines and levels, and final cleaning.
   3. Section 07 8413 “Penetration Firestopping” for patching penetrations in fire-rated construction.

1.2 INFORMATIONAL SUBMITTALS

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

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

1.3 QUALITY ASSURANCE

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

B. Cutting and Patching: Comply with requirements for and limitations on cutting and patching of construction elements.
   1. Structural Elements: When cutting and patching structural elements, notify Architect of locations and details of cutting and await directions from Architect before proceeding. Shore, brace, and support structural element during cutting and patching. Do not cut
and patch structural elements in a manner that could change their load-carrying capacity or increase deflection.

2. Other Construction Elements: Do not cut and patch other construction elements or components in a manner that could change their load-carrying capacity, that results in reducing their capacity to perform as intended, or that results in increased maintenance or decreased operational life or safety.

3. Visual Elements: Do not cut and patch construction in a manner that results in visual evidence of cutting and patching. Do not cut and patch exposed construction in a manner that would, in Architect's opinion, reduce the building's aesthetic qualities. Remove and replace construction that has been cut and patched in a visually unsatisfactory manner.

PART 2 - PRODUCTS

2.1 MATERIALS

A. General: Comply with requirements specified in other Sections.

B. In-Place Materials: Use materials for patching identical to in-place materials. For exposed surfaces, use materials that visually match in-place adjacent surfaces to the fullest extent possible.

1. If identical materials are unavailable or cannot be used, use materials that, when installed, will provide a match acceptable to Architect for the visual and functional performance of in-place materials.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Existing Conditions: The existence and location of underground and other utilities and construction indicated as existing are not guaranteed. Before beginning sitework, investigate and verify the existence and location of underground utilities, mechanical and electrical systems and other construction affecting the Work.

1. Before construction, verify the location and invert elevation at points of connection of sanitary sewer, storm sewer, and water-service piping; underground electrical services, and other utilities.

2. Furnish location data for work related to Project that must be performed by public utilities serving Project site.

B. Examination and Acceptance of Conditions: Before proceeding with each component of the Work, examine substrates, areas, and conditions, with Installer or Applicator present where indicated, for compliance with requirements for installation tolerances and other conditions affecting performance. Record observations.

1. Examine roughing-in for mechanical and electrical systems to verify actual locations of connections before equipment and fixture installation.

2. Examine walls, floors, and roofs for suitable conditions where products and systems are to be installed.
3. Verify compatibility with and suitability of substrates, including compatibility with existing finishes or primers.

C. Proceed with installation only after unsatisfactory conditions have been corrected. Proceeding with the Work indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Existing Utility Information: Furnish information to local utility and Owner that is necessary to adjust, move, or relocate existing utility structures, utility poles, lines, services, or other utility appurtenances located in or affected by construction. Coordinate with authorities having jurisdiction.

B. Field Measurements: Take field measurements as required to fit the Work properly. Recheck measurements before installing each product. Where portions of the Work are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication. Coordinate fabrication schedule with construction progress to avoid delaying the Work.

C. Space Requirements: Verify space requirements and dimensions of items shown diagrammatically on Drawings.

D. Review of Contract Documents and Field Conditions: Immediately on discovery of the need for clarification of the Contract Documents caused by differing field conditions outside the control of Contractor, submit a request for information to Architect according to requirements in Section 01 3100 "Project Management and Coordination."

3.3 CONSTRUCTION LAYOUT

A. Verification: Before proceeding to lay out the Work, verify layout information shown on Drawings, in relation to the property survey and existing benchmarks. If discrepancies are discovered, notify Architect promptly.

B. General: Engage a land surveyor to lay out the Work using accepted surveying practices.

1. Establish benchmarks and control points to set lines and levels at each story of construction and elsewhere as needed to locate each element of Project.

2. Establish limits on use of Project site.

3. Establish dimensions within tolerances indicated. Do not scale Drawings to obtain required dimensions.

4. Inform installers of lines and levels to which they must comply.

5. Check the location, level and plumb, of every major element as the Work progresses.

6. Notify Architect when deviations from required lines and levels exceed allowable tolerances.

7. Close site surveys with an error of closure equal to or less than the standard established by authorities having jurisdiction.

C. Site Improvements: Locate and lay out site improvements, including pavements, grading, fill and topsoil placement, utility slopes, and rim and invert elevations.
D. Building Lines and Levels: Locate and lay out control lines and levels for structures, building foundations, column grids, and floor levels, including those required for mechanical and electrical work. Transfer survey markings and elevations for use with control lines and levels. Level foundations and piers from two or more locations.

E. Record Log: Maintain a log of layout control work. Record deviations from required lines and levels. Include beginning and ending dates and times of surveys, weather conditions, name and duty of each survey party member, and types of instruments and tapes used. Make the log available for reference by Architect.

3.4 FIELD ENGINEERING

A. Reference Points: Locate existing permanent benchmarks, control points, and similar reference points before beginning the Work. Preserve and protect permanent benchmarks and control points during construction operations.

B. Benchmarks: Establish and maintain a minimum of two (2) permanent benchmarks on Project site, referenced to data established by survey control points. Comply with authorities having jurisdiction for type and size of benchmark.

1. Record benchmark locations, with horizontal and vertical data, on Project Record.

3.5 INSTALLATION

A. General: Locate the Work and components of the Work accurately, in correct alignment and elevation, as indicated.

1. Make vertical work plumb and make horizontal work level.

2. Where space is limited, install components to maximize space available for maintenance and ease of removal for replacement.

3. Conceal pipes, ducts, and wiring in finished areas unless otherwise indicated.

B. Comply with manufacturer's written instructions and recommendations for installing products in applications indicated.

C. Install products at the time and under conditions that will ensure the best possible results. Maintain conditions required for product performance until Substantial Completion.

D. Conduct construction operations so no part of the Work is subjected to damaging operations or loading in excess of that expected during normal conditions of occupancy.

E. Sequence the Work and allow adequate clearances to accommodate movement of construction items on site and placement in permanent locations.

F. Tools and Equipment: Do not use tools or equipment that produce harmful noise levels.

G. Templates: Obtain and distribute to the parties involved templates for work specified to be factory prepared and field installed. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing products to comply with indicated requirements.
H. Attachment: Provide blocking and attachment plates and anchors and fasteners of adequate size and number to securely anchor each component in place, accurately located and aligned with other portions of the Work. Where size and type of attachments are not indicated, verify size and type required for load conditions.
   1. Mounting Heights: Where mounting heights are not indicated, mount components at heights directed by Architect.
   2. Allow for building movement, including thermal expansion and contraction.
   3. Coordinate installation of anchorages. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors, that are to be embedded in concrete or masonry. Deliver such items to Project site in time for installation.

I. Joints: Make joints of uniform width. Where joint locations in exposed work are not indicated, arrange joints for the best visual effect. Fit exposed connections together to form hairline joints.

J. Hazardous Materials: Use products, cleaners, and installation materials that are not considered hazardous.

3.6 CUTTING AND PATCHING

A. Cutting and Patching, General: Employ skilled workers to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time, and complete without delay.
   1. Cut in-place construction to provide for installation of other components or performance of other construction, and subsequently patch as required to restore surfaces to their original condition.

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

C. Temporary Support: Provide temporary support of work to be cut.

D. Protection: Protect in-place construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of Project that might be exposed during cutting and patching operations.

E. Adjacent Occupied Areas: Avoid interference with use of adjoining areas or interruption of free passage to adjoining areas.

F. Existing Utility Services and Mechanical/Electrical Systems: Where existing services/systems are required to be removed, relocated, or abandoned, bypass such services/systems before cutting to prevent interruption to adjoining areas.

G. Cutting: Cut in-place construction by sawing, drilling, breaking, chipping, grinding, and similar operations, including excavation, using methods least likely to damage elements retained or adjoining construction. If possible, review proposed procedures with original Installer; comply with original Installer's written recommendations.
   1. In general, use hand or small power tools designed for sawing and grinding, not hammering and chopping. Cut holes and slots neatly to minimum size required, and
with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. Finished Surfaces: Cut or drill from the exposed or finished side into concealed surfaces.

3. Concrete and Masonry: Cut using a cutting machine, such as an abrasive saw or a diamond-core drill.

4. Excavating and Backfilling: Comply with requirements in applicable Sections where required by cutting and patching operations.

5. Mechanical and Electrical Services: Cut off pipe or conduit in walls or partitions to be removed. Cap, valve, or plug and seal remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after cutting.

6. Proceed with patching after construction operations requiring cutting are complete.

H. Patching: Patch construction by filling, repairing, refinishing, closing up, and similar operations following performance of other work. Patch with durable seams that are as invisible as practicable. Provide materials and comply with installation requirements specified in other Sections, where applicable.

1. Inspection: Where feasible, test and inspect patched areas after completion to demonstrate physical integrity of installation.

2. Exposed Finishes: Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will minimize evidence of patching and refinishing.

3. Floors and Walls: Provide an even surface of uniform finish, color, texture, and appearance. Remove in-place floor and wall coverings and replace with new materials, if necessary, to achieve uniform color and appearance.

4. Ceilings: Patch, repair, or rehang in-place ceilings as necessary to provide an even-plane surface of uniform appearance.

5. Exterior Building Enclosure: Patch components in a manner that restores enclosure to a weathertight condition and ensures thermal and moisture integrity of building enclosure.

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

3.7 PROGRESS CLEANING

A. General: Clean Project site and work areas daily, including common areas. Enforce requirements strictly. Dispose of materials lawfully.


2. Do not hold waste materials more than seven days during normal weather or three days if the temperature is expected to rise above 80 deg F (27 deg C).

3. Containerize hazardous and unsanitary waste materials separately from other waste. Mark containers appropriately and dispose of legally, according to regulations.
B. Site: Maintain Project site free of waste materials and debris.

C. Work Areas: Clean areas where work is in progress to the level of cleanliness necessary for proper execution of the Work.
   1. Remove liquid spills promptly.
   2. Where dust would impair proper execution of the Work, broom-clean or vacuum the entire work area, as appropriate.

D. Installed Work: Keep installed work clean. Clean installed surfaces according to written instructions of manufacturer or fabricator of product installed, using only cleaning materials specifically recommended. If specific cleaning materials are not recommended, use cleaning materials that are not hazardous to health or property and that will not damage exposed surfaces.

E. Concealed Spaces: Remove debris from concealed spaces before enclosing the space.

F. Exposed Surfaces in Finished Areas: Clean exposed surfaces and protect as necessary to ensure freedom from damage and deterioration at time of Substantial Completion.

G. Waste Disposal: Do not bury or burn waste materials on-site. Do not wash waste materials down sewers or into waterways.

H. During handling and installation, clean and protect construction in progress and adjoining materials already in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

I. Clean and provide maintenance on completed construction as frequently as necessary through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

J. Limiting Exposures: Supervise construction operations to assure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period.

3.8 STARTING AND ADJUSTING

A. Start equipment and operating components to confirm proper operation. Remove malfunctioning units, replace with new units, and retest.

B. Adjust equipment for proper operation. Adjust operating components for proper operation without binding.

C. Test each piece of equipment to verify proper operation. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and equipment.

D. Manufacturer's Field Service: Comply with qualification requirements in Section 01 4000 "Quality Requirements"

3.9 PROTECTION OF INSTALLED CONSTRUCTION

A. Provide final protection and maintain conditions that ensure installed Work is without damage or deterioration at time of Substantial Completion.

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

END OF SECTION 01 7300
SECTION 01 7419 - CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for the following:
   1. Recycling nonhazardous demolition and construction waste.
   2. Disposing of nonhazardous demolition and construction waste.

B. Related Requirements:
   1. Section 02 4116 "Structure Demolition" for disposition of waste resulting from demolition of buildings, structures, and site improvements.
   2. Section 04 2000 "Unit Masonry" for disposal requirements for masonry waste.
   3. Section 31 1000 "Site Clearing" for disposition of waste resulting from site clearing and removal of above- and below-grade improvements.

1.2 DEFINITIONS

A. Construction Waste: Building and site improvement materials and other solid waste resulting from construction, remodeling, renovation, or repair operations. Construction waste includes packaging.

B. Demolition Waste: Building and site improvement materials resulting from demolition or selective demolition operations.

C. Disposal: Removal off-site of demolition and construction waste and subsequent sale, recycling, reuse, or deposit in landfill or incinerator acceptable to authorities having jurisdiction.

D. Recycle/Waste Diversion: Recovery of demolition or construction waste for subsequent processing in preparation for reuse.

1.3 PERFORMANCE REQUIREMENTS

A. General: Achieve end-of-Project rates for recycling/waste diversion of 70 to 80% percent by weight of total non-hazardous solid waste generated by the Work. The General Contractor needs to develop a waste management plan of materials (see section 1.5 A below) that identifies the total percentage of waste diverted from the landfill.

1.4 ACTION SUBMITTALS

A. Waste Management Plan: Submit plan for approval within seven (7) days of date established for the Notice to Proceed. The General Contractor shall develop a waste management plan (WMP) that outlines procedures for waste management including monitoring, collecting and waste reduction strategies, identifies all waste materials as either salvaged, reused, recycled or disposed of, designates a waste management coordinator, sets waste management goals,
defines the types and estimated amounts of waste, defines handling procedures for all waste, describes a method for communicating the plan to all personnel, and documents that the waste management requirements have been included on all sub-contracts. The Contractor shall implement a waste management program to divert as much of the waste stream from entering a landfill. Diversion rates for land clearing and/or demolition shall be recorded separately from new construction waste diversion rates.

1.5 INFORMATIONAL SUBMITTALS

A. Waste Reduction Progress Reports (waste tickets from the waste hauler): Concurrent with each Application for Payment, submit report. Include the following information:
   1. Material category.
   2. Total quantity of waste in tons.
   3. Quantity of waste diverted from the landfill in tons.
   4. Total quantity of waste diverted in tons.
   5. Total quantity of waste diverted from the landfill as a percentage of total waste.

B. Waste Diversion Calculations: Before request for Substantial Completion, submit calculated end-of-Project rates/final waste diversion log or summary to Green Rater that identifies the total project percentage of waste diverted from the landfill.

C. Records of Donations or Sales: Indicate receipt and acceptance of salvageable waste donated to individuals and organizations. Indicate whether organization is tax exempt. Ask Green Rater for template.

D. Recycling and Processing Facility Records: Indicate receipt and acceptance of recyclable waste by recycling and processing facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

E. Landfill and Incinerator Disposal Records: Indicate receipt and acceptance of waste by landfills and incinerator facilities licensed to accept them. Include manifests, weight tickets, receipts, and invoices.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 PLAN IMPLEMENTATION

A. General: Implement approved waste management plan. Provide handling, containers, storage, signage, transportation, and other items as required to implement waste management plan during the entire duration of the Contract.

B. Training: Train workers, subcontractors, and suppliers on proper waste management procedures, as appropriate for the Work occurring at Project site.
1. Distribute waste management plan to everyone concerned within three (3) days of submittal return.

2. Distribute waste management plan to entities when they first begin work on-site. Review plan procedures and locations established for salvage, recycling, and disposal.

C. Site Access and Temporary Controls: Conduct waste management operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

   1. Designate and label specific areas on Project site necessary for separating materials that are to be salvaged, recycled, reused, donated, and sold.

   2. Comply with Section 01 5000 “Temporary Facilities and Controls” for controlling dust and dirt, environmental protection, and noise control.
### 3.2 SAMPLE FORMS

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<th>Date of Activity</th>
<th>Ticket Number</th>
<th>Size</th>
<th>Lead Cardboard</th>
<th>Lead Plastic</th>
<th>Lead Wood</th>
<th>Total Material Disposed</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/21/2011</td>
<td>2258499</td>
<td>30</td>
<td>15</td>
<td>5</td>
<td>10</td>
<td>30</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Diverted/Recycled Materials Description</th>
<th>Diversion/Recycling Hauler Of Location</th>
<th>Quantity of Diverted / Recycled Waste</th>
<th>Units (tons/cy)</th>
<th>Pounds per yard</th>
<th>Total Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lead Cardboard</td>
<td>Sun Recycling</td>
<td>15</td>
<td>Yards</td>
<td>100</td>
<td>0.75</td>
</tr>
<tr>
<td>Lead Plastic</td>
<td>Sun Recycling</td>
<td>5</td>
<td>Yards</td>
<td>150</td>
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<tr>
<td>Lead Wood</td>
<td>Sun Recycling</td>
<td>10</td>
<td>Yards</td>
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</table>

Total Construction Waste Diverted: 30

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<thead>
<tr>
<th>Landfill Material Description</th>
<th>Landfill Hauler or Location</th>
<th>Quantity of Diverted/R recycled Waste</th>
<th>Units (tons/cy)</th>
<th>Pounds per yard</th>
<th>Total Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>Misc / Trash</td>
<td>Central</td>
<td>Yards</td>
<td>500</td>
<td>0.00</td>
<td></td>
</tr>
</tbody>
</table>

Total Construction Waste Sent to Landfill: 0

Total of All Construction Waste: 30

% Of Construction Waste Diverted from Landfill: 100%

Approved by: Charles Lomangino, Southern Waste Systems

Weights set forth are field estimates based on judgment of experienced personnel.
SECTION 01 7700 - CLOSEOUT PROCEDURES

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes administrative and procedural requirements for contract closeout, including, but not limited to, the following:
   1. Substantial Completion procedures.
   2. Final completion procedures.
   3. Warranties.
   4. Final cleaning.
   5. Repair of the Work.
B. Related Requirements:
   1. Section 01 3233 "Photographic Documentation" for submitting final completion construction photographic documentation.
   2. Section 01 7823 "Operation and Maintenance Data" for operation and maintenance manual requirements.
   3. Section 01 7839 "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
   4. Section 01 7900 "Demonstration and Training" for requirements for instructing Owner's personnel.

1.2 ACTION SUBMITTALS
A. Product Data: For cleaning agents.
B. Contractor's List of Incomplete Items: Initial submittal at Substantial Completion.
C. Certified List of Incomplete Items: Final submittal at Final Completion.

1.3 CLOSEOUT SUBMITTALS
A. Certificates of Release: From authorities having jurisdiction.
B. Certificate of Insurance: For continuing coverage.
C. Field Report: For pest control inspection.

1.4 MAINTENANCE MATERIAL SUBMITTALS
A. Schedule of Maintenance Material Items: For maintenance material submittal items specified in other Sections.
1.5 SUBSTANTIAL COMPLETION PROCEDURES

A. Contractor's List of Incomplete Items: Prepare and submit a list of items to be completed and corrected (Contractor's punch list), indicating the value of each item on the list and reasons why the Work is incomplete.

B. Submittals Prior to Substantial Completion: Complete the following a minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Certificates of Release: Obtain and submit releases from authorities having jurisdiction permitting Owner unrestricted use of the Work and access to services and utilities. Include occupancy permits, operating certificates, and similar releases.

2. Submit closeout submittals specified in other Division 01 Sections, including project record documents, operation and maintenance manuals, final completion photographic documentation, damage or settlement surveys, property surveys, and similar final record information.

3. Submit closeout submittals specified in individual Sections, including specific warranties, workmanship bonds, maintenance service agreements, final certifications, and similar documents.

4. Submit maintenance material submittals specified in individual Sections, including tools, spare parts, extra materials, and similar items, and deliver to location designated by Architect. Label with manufacturer's name and model number where applicable.

   a. Schedule of Maintenance Material Items: Prepare and submit schedule of maintenance material submittal items, including name and quantity of each item and name and number of related Specification Section. Obtain Architect’s signature for receipt of submittals.

5. Submit test/adjust/balance records.

6. Submit changeover information related to Owner's occupancy, use, operation, and maintenance.

C. Procedures Prior to Substantial Completion: Complete the following a minimum of ten (10) days prior to requesting inspection for determining date of Substantial Completion. List items below that are incomplete at time of request.

1. Advise Owner of pending insurance changeover requirements.

2. Make final changeover of permanent locks and deliver keys to Owner. Advise Owner's personnel of changeover in security provisions.

3. Complete startup and testing of systems and equipment.

4. Perform preventive maintenance on equipment used prior to Substantial Completion.

5. Instruct Owner's personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings specified in Section 01 7900 "Demonstration and Training.”

6. Advise Owner of changeover in heat and other utilities.
7. Participate with Owner in conducting inspection and walkthrough with local emergency responders.

8. Terminate and remove temporary facilities from Project site, along with mockups, construction tools, and similar elements.

9. Complete final cleaning requirements, including touchup painting.

10. Touch up and otherwise repair and restore marred exposed finishes to eliminate visual defects.

D. Inspection: Submit a written request for inspection to determine Substantial Completion a minimum of ten (10) days prior to date the work will be completed and ready for final inspection and tests. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare the Certificate of Substantial Completion after inspection or will notify Contractor of items, either on Contractor’s list or additional items identified by Architect, that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.

2. Results of completed inspection will form the basis of requirements for final completion.

1.6 FINAL COMPLETION PROCEDURES

A. Preliminary Procedures: Before requesting final inspection for determining final completion, complete the following:

1. Submit a final Application for Payment according to Section 01 2900 “Payment Procedures.”

2. Certified List of Incomplete Items: Submit certified copy of Architect’s Substantial Completion inspection list of items to be completed or corrected (punch list), endorsed and dated by Architect. Certified copy of the list shall state that each item has been completed or otherwise resolved for acceptance.

3. Certificate of Insurance: Submit evidence of final, continuing insurance coverage complying with insurance requirements.

4. Submit pest-control final inspection report and warranty.

5. Instruct Owner’s personnel in operation, adjustment, and maintenance of products, equipment, and systems. Submit demonstration and training video recordings.

B. Inspection: Submit a written request for final inspection to determine acceptance. On receipt of request, Architect will either proceed with inspection or notify Contractor of unfulfilled requirements. Architect will prepare a final Certificate for Payment after inspection or will notify Contractor of construction that must be completed or corrected before certificate will be issued.

1. Reinspection: Request reinspection when the Work identified in previous inspections as incomplete is completed or corrected.
1.7 LIST OF INCOMPLETE ITEMS (PUNCH LIST)

A. Organization of List: Include name and identification of each space and area affected by construction operations for incomplete items and items needing correction including, if necessary, areas disturbed by Contractor that are outside the limits of construction.

1. Organize list of spaces in sequential order, starting with exterior areas first and proceeding from lowest floor to highest floor ending on roof.

2. Organize items applying to each space by major element, including categories for ceiling, individual walls, floors, equipment, and building systems.

3. Submit list of incomplete items in the following format:
   a. MS Excel or MS Word electronic file. Architect will return annotated copy.
   b. Final endorsed format to be electronically signed PDF electronic file or digital scan of signed hardcopy.

1.8 SUBMITTAL OF PROJECT WARRANTIES

A. Time of Submittal: Submit written warranties on request of Architect for designated portions of the Work where commencement of warranties other than date of Substantial Completion is indicated, or when delay in submittal of warranties might limit Owner's rights under warranty.

B. Organize warranty documents into an orderly sequence based on the table of contents of the Project Manual.

1. Bind warranties and bonds in heavy-duty, three-ring, vinyl-covered, loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8-1/2-by-11-inch (215-by-280-mm) paper.

2. Provide heavy paper dividers with plastic-covered tabs for each separate warranty. Mark tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product and the name, address, and telephone number of Installer.

3. Identify each binder on the front and spine with the typed or printed title "WARRANTIES," Project name, and name of Contractor.

4. Warranty Electronic File: Scan warranties and bonds and assemble complete warranty and bond submittal package into a single indexed electronic PDF file with links enabling navigation to each item. Provide bookmarked table of contents at beginning of document.

C. Provide additional copies of each warranty to include in operation and maintenance manuals.
PART 2 - PRODUCTS

2.1 MATERIALS

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

   1. Use cleaning products that comply with Green Seal's GS-37, or if GS-37 is not applicable, use products that comply with the California Code of Regulations maximum allowable VOC levels.

PART 3 - EXECUTION

3.1 FINAL CLEANING

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

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

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

      a. Clean Project site, yard, and grounds, in areas disturbed by construction activities, including landscape development areas, of rubbish, waste material, litter, and other foreign substances.

      b. Sweep paved areas broom clean. Remove petrochemical spills, stains, and other foreign deposits.

      c. Rake grounds that are neither planted nor paved to a smooth, even-textured surface.

      d. Remove tools, construction equipment, machinery, and surplus material from Project site.

      e. Remove snow and ice to provide safe access to building.

      f. Clean exposed exterior and interior hard-surfaced finishes to a dirt-free condition, free of stains, films, and similar foreign substances. Avoid disturbing natural weathering of exterior surfaces. Restore reflective surfaces to their original condition.

      g. Remove debris and surface dust from limited access spaces, including roofs, plenums, shafts, trenches, equipment vaults, manholes, attics, and similar spaces.

      h. Sweep concrete floors broom clean in unoccupied spaces.
i. Vacuum & mop resilient floors according to manufacturer’s recommendations.

j. Vacuum carpet and similar soft surfaces, removing debris and excess nap; clean according to manufacturer’s recommendations if visible soil or stains remain.

k. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compounds and other noticeable, vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials. Polish mirrors and glass, taking care not to scratch surfaces.

l. Remove labels that are not permanent.

m. Wipe surfaces of mechanical and electrical equipment, elevator equipment and similar equipment. Remove excess lubrication, paint and mortar droppings, and other foreign substances.

n. Clean ductwork if HVAC was utilized during construction or if duct system was contaminated with particulate during construction activities.

o. Clean plumbing fixtures to a sanitary condition, free of stains, including stains resulting from water exposure.

p. Replace disposable air filters and clean permanent air filters. Clean exposed surfaces of diffusers, registers, and grills.

q. Clean light fixtures, lamps, globes, and reflectors to function with full efficiency.

r. Leave Project clean and ready for occupancy.

C. Pest Control: Comply with pest control requirements in Section 01 5000 "Temporary Facilities and Controls." Prepare written report.

3.2 REPAIR OF THE WORK

A. Complete repair and restoration operations before requesting inspection for determination of Substantial Completion.

B. Repair or remove and replace defective construction. Repairing includes replacing defective parts, refinishing damaged surfaces, touching up with matching materials, and properly adjusting operating equipment. Where damaged or worn items cannot be repaired or restored, provide replacements. Remove and replace operating components that cannot be repaired. Restore damaged construction and permanent facilities used during construction to specified condition.

1. Remove and replace chipped, scratched, and broken glass, reflective surfaces, and other damaged transparent materials.

2. Touch up and otherwise repair and restore marred or exposed finishes and surfaces. Replace finishes and surfaces that already show evidence of repair or restoration.

   a. Do not paint over "UL" and other required labels and identification, including mechanical and electrical nameplates. Remove paint applied to required labels and identification.

3. Replace parts subject to operating conditions during construction that may impede operation or reduce longevity.
4. Replace burned-out bulbs, bulbs noticeably dimmed by hours of use, and defective and noisy starters in fluorescent and mercury vapor fixtures to comply with requirements for new fixtures.

END OF SECTION 01 7700
SECTION 01 7823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for preparing operation and maintenance manuals, including the following:

1. Operation and maintenance documentation directory.
2. Emergency manuals.
3. Operation manuals for systems, subsystems, and equipment.
4. Product maintenance manuals.
5. Systems and equipment maintenance manuals.

1.2 CLOSEOUT SUBMITTALS

A. Manual Content: Operations and maintenance manual content is specified in individual Specification Sections to be reviewed at the time of Section submittals. Submit reviewed manual content formatted and organized as required by this Section.

1. Architect will comment on whether content of operations and maintenance submittals are acceptable.
2. Where applicable, clarify and update reviewed manual content to correspond to revisions and field conditions.

B. Format: Submit operations and maintenance manuals in the following format:

   a. Name each indexed document file in composite electronic index with applicable item name. Include a complete electronically linked operation and maintenance directory.
   b. Enable inserted reviewer comments on draft submittals.

2. Three paper copies. Include a complete operation and maintenance directory. Enclose title pages and directories in clear plastic sleeves. Architect will return two copies.

C. Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least fifteen (15) days before commencing demonstration and training. Architect and LEED for Homes Provider will return copy with comments.

1. Correct or revise each manual to comply with Architect's and LEED for Homes Provider’s comments. Submit copies of each corrected manual within fifteen (15) days of receipt of Architect's and LEED for Homes Provider’s comments and prior to commencing demonstration and training.
PART 2 - PRODUCTS

2.1 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

A. Directory: Prepare a single, comprehensive directory of emergency, operation, and maintenance data and materials, listing items and their location to facilitate ready access to desired information.

B. Organization: Unless otherwise indicated, organize each manual into a separate section for each system and subsystem, and a separate section for each piece of equipment not part of a system. Each manual shall contain the following materials, in the order listed:
   1. Title page.
   2. Table of contents.

C. Title Page: Include the following information:
   1. Subject matter included in manual.
   2. Name and address of Project.
   3. Name and address of Owner.
   4. Date of submittal.
   5. Name and contact information for Contractor.
   6. Name and contact information for Architect.
   7. Name and contact information for LEED for Homes Provider.
   8. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
   9. Cross-reference to related systems in other operation and maintenance manuals.

D. Table of Contents: List each product included in manual, identified by product name, indexed to the content of the volume, and cross-referenced to Specification Section number in Project Manual.

E. Manual Contents: Organize into sets of manageable size. Arrange contents alphabetically by system, subsystem, and equipment. If possible, assemble instructions for subsystems, equipment, and components of one system into a single binder.

F. Manuals, Electronic Files: Submit manuals in the form of a multiple file composite electronic PDF file for each manual type required.
   1. Electronic Files: Use electronic files prepared by manufacturer where available. Where scanning of paper documents is required, configure scanned file for minimum readable file size.
   2. File Names and Bookmarks: Enable bookmarking of individual documents based on file names. Name document files to correspond to system, subsystem, and equipment names used in manual directory and table of contents. Group documents for each system and subsystem into individual composite bookmarked files, then create composite manual, so that resulting bookmarks reflect the system, subsystem, and
equipment names in a readily navigated file tree. Configure electronic manual to display bookmark panel on opening file.

G. Manuals, Paper Copy: Submit manuals in the form of hard copy, bound and labeled volumes.

1. Binders: Heavy-duty, three-ring, vinyl-covered binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch (215-by-280-mm) paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.
   a. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents. Indicate volume number for multiple-volume sets (eg: Volume 1 of 4).

2. Dividers: Heavy-paper dividers with plastic-covered tabs for each section of the manual. Mark each tab to indicate contents. Include typed list of products and major components of equipment included in the section on each divider, cross-referenced to Specification Section number and title of Project Manual.

3. Protective Plastic Sleeves: Transparent plastic sleeves designed to enclose diagnostic software storage media for computerized electronic equipment.

4. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.
   a. If oversize drawings are necessary, fold drawings to same size as text pages and use as foldouts.
   b. If drawings are too large to be used as foldouts, fold and place drawings in labeled envelopes and bind envelopes in rear of manual. At appropriate locations in manual, insert typewritten pages indicating drawing titles, descriptions of contents, and drawing locations.

2.2 EMERGENCY MANUALS

A. Content: Organize manual into a separate section for each of the following:
   1. Type of emergency.
   2. Emergency instructions.
   3. Emergency procedures.

B. Type of Emergency: Where applicable for each type of emergency indicated below, include instructions and procedures for each system, subsystem, piece of equipment, and component:
   1. Fire.
   2. Flood.
   3. Water leak.
   5. Water outage.
   6. System, subsystem, or equipment failure.
7. Chemical release or spill.

C. Emergency Instructions: Describe and explain warnings, trouble indications, error messages, and similar codes and signals. Include responsibilities of Owner's operating personnel for notification of Installer, supplier, and manufacturer to maintain warranties.

D. Emergency Procedures: Include the following, as applicable:
   1. Instructions on stopping.
   2. Shutdown instructions for each type of emergency.
   3. Operating instructions for conditions outside normal operating limits.
   4. Required sequences for electric or electronic systems.
   5. Special operating instructions and procedures.

2.3 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:
   2. Performance and design criteria if Contractor is delegated design responsibility.
   3. Operating standards.
   4. Operating procedures.
   5. Operating logs.
   6. Wiring diagrams.
   7. Control diagrams.
   8. Piped system diagrams.
   9. Precautions against improper use.
   10. License requirements including inspection and renewal dates.

B. Descriptions: Include the following:
   1. Product name and model number. Use designations for products indicated on Contract Documents.
   2. Manufacturer's name.
   3. Equipment identification with serial number of each component.
   4. Equipment function.
   5. Operating characteristics.
   6. Limiting conditions.
   7. Performance curves.
   8. Engineering data and tests.
   9. Complete nomenclature and number of replacement parts.
C. Operating Procedures: Include the following, as applicable:
   1. Startup procedures.
   2. Equipment or system break-in procedures.
   3. Routine and normal operating instructions.
   4. Regulation and control procedures.
   5. Instructions on stopping.
   7. Seasonal and weekend operating instructions.
   8. Required sequences for electric or electronic systems.
   9. Special operating instructions and procedures.

D. Systems and Equipment Controls: Describe the sequence of operation, and diagram controls as installed.

E. Piped Systems: Diagram piping as installed, and identify color-coding where required for identification.

2.4 PRODUCT MAINTENANCE MANUALS

A. Content: Organize manual into a separate section for each product, material, and finish. Include source information, product information, maintenance procedures, repair materials and sources, and warranties and bonds, as described below.

B. Source Information: List each product included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Product Information: Include the following, as applicable:
   1. Product name and model number.
   2. Manufacturer's name.
   3. Color, pattern, and texture.
   5. Reordering information for specially manufactured products.

D. Maintenance Procedures: Include manufacturer's written recommendations and the following:
   1. Inspection procedures.
   2. Types of cleaning agents to be used and methods of cleaning.
   3. List of cleaning agents and methods of cleaning detrimental to product.
   4. Schedule for routine cleaning and maintenance.
   5. Repair instructions.
E. Repair Materials and Sources: Include lists of materials and local sources of materials and related services.

F. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

2.5 SYSTEMS AND EQUIPMENT MAINTENANCE MANUALS

A. Content: For each system, subsystem, and piece of equipment not part of a system, include source information, manufacturers' maintenance documentation, maintenance procedures, maintenance and service schedules, spare parts list and source information, maintenance service contracts, and warranty and bond information, as described below.

B. Source Information: List each system, subsystem, and piece of equipment included in manual, identified by product name and arranged to match manual's table of contents. For each product, list name, address, and telephone number of Installer or supplier and maintenance service agent, and cross-reference Specification Section number and title in Project Manual.

C. Manufacturers' Maintenance Documentation: Manufacturers' maintenance documentation including the following information for each component part or piece of equipment:
   1. Standard maintenance instructions and bulletins.
   2. Drawings, diagrams, and instructions required for maintenance, including disassembly and component removal, replacement, and assembly.
   3. Identification and nomenclature of parts and components.
   4. List of items recommended to be stocked as spare parts.

D. Maintenance Procedures: Include the following information and items that detail essential maintenance procedures:
   1. Test and inspection instructions.
   2. Troubleshooting guide.
   3. Precautions against improper maintenance.
   4. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   5. Aligning, adjusting, and checking instructions.
   6. Demonstration and training video recording, if available.

E. Maintenance and Service Schedules: Include service and lubrication requirements, list of required lubricants for equipment, and separate schedules for preventive and routine maintenance and service with standard time allotment.

F. Spare Parts List and Source Information: Include lists of replacement and repair parts, with parts identified and cross-referenced to manufacturers' maintenance documentation and local sources of maintenance materials and related services.

G. Maintenance Service Contracts: Include copies of maintenance agreements with name and telephone number of service agent.
H. Warranties and Bonds: Include copies of warranties and bonds and lists of circumstances and conditions that would affect validity of warranties or bonds.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Emergency Manual: Assemble a complete set of emergency information indicating procedures for use by emergency personnel and by Owner's operating personnel for types of emergencies indicated.

B. Product Maintenance Manual: Assemble a complete set of maintenance data indicating care and maintenance of each product, material, and finish incorporated into the Work.

C. Operation and Maintenance Manuals: Assemble a complete set of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

D. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

E. Drawings: Prepare drawings supplementing manufacturers' printed data to illustrate the relationship of component parts of equipment and systems and to illustrate control sequence and flow diagrams. Coordinate these drawings with information contained in record Drawings to ensure correct illustration of completed installation.

1. Do not use original project record documents as part of operation and maintenance manuals.

F. Comply with Section 01 7700 "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 01 7823
SECTION 01 7839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes administrative and procedural requirements for project record documents, including the following:
      1. Record Drawings.
      2. Record Specifications.
      3. Record Product Data.
   B. Related Requirements:
      1. Section 01 7823 "Operation and Maintenance Data" for operation and maintenance manual requirements.

1.2 CLOSEOUT SUBMITTALS
   A. Record Drawings: Comply with the following:
      1. Number of Copies: Submit copies of record Drawings as follows:
         a. Initial Submittal:
            1) Submit one (1) paper-copy set(s) of marked-up record prints.
            2) Architect will indicate whether general scope of changes, additional information recorded, and quality of drafting are acceptable.
         b. Final Submittal:
            1) Submit PDF electronic files of scanned record prints and three (3) set(s) of prints.
            2) Print each drawing, whether or not changes and additional information were recorded.
   B. Record Specifications: Submit one paper copy and an annotated PDF electronic file of Project's Specifications, including addenda and contract modifications.
   C. Record Product Data: Submit annotated PDF electronic files and directories of each submittal.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS
   A. Record Prints: Maintain one set of marked-up paper copies of the Contract Drawings and Shop Drawings, incorporating new and revised Drawings as modifications are issued.
1. Preparation: Mark record prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to provide information for preparation of corresponding marked-up record prints.
   a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
   b. Record data as soon as possible after obtaining it.
   c. Record and check the markup before enclosing concealed installations.

2. Mark the Contract Drawings and Shop Drawings completely and accurately. Use personnel proficient at recording graphic information in production of marked-up record prints.

3. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.

4. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Record Digital Data Files: Immediately before inspection for Certificate of Substantial Completion, review marked-up record prints with Architect. When authorized, prepare a full set of corrected digital data files of the Contract Drawings, as follows:


2. Incorporate changes and additional information previously marked on record prints. Delete, redraw, and add details and notations where applicable.

3. Refer instances of uncertainty to Architect for resolution.


C. Format: Identify and date each record Drawing; include the designation “PROJECT RECORD DRAWING” in a prominent location.

1. Record Prints: Organize record prints and newly prepared record Drawings into manageable sets. Bind each set with durable paper cover sheets. Include identification on cover sheets.


3. Record Digital Data Files: Organize digital data information into separate electronic files that correspond to each sheet of the Contract Drawings. Name each file with the sheet identification. Include identification in each digital data file.

4. Identification: As follows:
   a. Project name.
   b. Date.
   c. Designation “PROJECT RECORD DRAWINGS.”
   d. Name of Architect.
   e. Name of Contractor.
2.2 RECORD SPECIFICATIONS
   A. Preparation: Mark Specifications to indicate the actual product installation where installation
      varies from that indicated in Specifications, addenda, and contract modifications.
      1. Give particular attention to information on concealed products and installations that
         cannot be readily identified and recorded later.
      2. Record the name of manufacturer, supplier, Installer, and other information necessary
         to provide a record of selections made.
      3. Note related Change Orders, record Product Data, and record Drawings where
         applicable.
   B. Format: Submit record Specifications as paper copy scanned PDF electronic file(s) of
      marked-up paper copy of Specifications.

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

2.4 MISCELLANEOUS RECORD SUBMITTALS
   A. Assemble miscellaneous records required by other Specification Sections for miscellaneous
      record keeping and submittal in connection with actual performance of the Work. Bind or
      file miscellaneous records and identify each, ready for continued use and reference.
   B. Format: Submit miscellaneous record submittals as paper copy and scanned PDF electronic
      file(s) of marked-up miscellaneous record submittals.

PART 3 - EXECUTION

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

END OF SECTION 01 7839
SECTION 01 7900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes administrative and procedural requirements for instructing Owner's personnel, including the following:
   1. Demonstration of operation of systems, subsystems, and equipment.
   2. Training in operation and maintenance of systems, subsystems, and equipment.
   3. Demonstration and training video recordings.

1.2 INFORMATIONAL SUBMITTALS
A. Instruction Program: Submit outline of instructional program for demonstration and training, including a list of training modules and a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.
   1. Indicate proposed training modules using manufacturer-produced demonstration and training video recordings for systems, equipment, and products in lieu of video recording of live instructional module.

1.3 CLOSEOUT SUBMITTALS
A. Demonstration and Training Video Recordings: Submit two (2) copies within seven (7) days of end of each training module.
   1. At completion of training, submit complete training manual(s) for Owner's use prepared and bound in format matching operation and maintenance manuals and in PDF electronic file format on optical disc.

1.4 QUALITY ASSURANCE
A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.
B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Section 01 4000 "Quality Requirements," experienced in operation and maintenance procedures and training.
C. Preinstruction Conference: Conduct conference at Project site to comply with requirements in Section 01 3100 "Project Management and Coordination." Review methods and procedures related to demonstration and training.
1.5 COORDINATION

A. Coordinate instruction schedule with Owner's operations. Adjust schedule as required to minimize disrupting Owner's operations and to ensure availability of Owner's personnel.

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

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

A. Program Structure: Develop an instruction program that includes individual training modules for each system and for equipment not part of a system, as required by individual Specification Sections.

B. Training Modules: Develop a learning objective and teaching outline for each module. Include a description of specific skills and knowledge that participant is expected to master. For each module, include instruction for the following as applicable to the system, equipment, or component:

1. Basis of System Design, Operational Requirements, and Criteria: Include the following:
   a. System, subsystem, and equipment descriptions.
   b. Performance and design criteria if Contractor is delegated design responsibility.
   c. Operating standards.
   d. Regulatory requirements.
   e. Equipment function.
   f. Operating characteristics.
   g. Limiting conditions.
   h. Performance curves.

2. Documentation: Review the following items in detail:
   a. Emergency manuals.
   b. Operations manuals.
   c. Maintenance manuals.
   d. Project record documents.
   e. Identification systems.
   f. Warranties and bonds.
   g. Maintenance service agreements and similar continuing commitments.

3. Emergencies: Include the following, as applicable:
   a. Instructions on meaning of warnings, trouble indications, and error messages.
b. Instructions on stopping.

c. Shutdown instructions for each type of emergency.

d. Operating instructions for conditions outside of normal operating limits.

e. Sequences for electric or electronic systems.

f. Special operating instructions and procedures.

4. Operations: Include the following, as applicable:

a. Startup procedures.

b. Equipment or system break-in procedures.

c. Routine and normal operating instructions.

4. Operations: Include the following, as applicable:

d. Regulation and control procedures.

e. Control sequences.

f. Safety procedures.

g. Instructions on stopping.

h. Normal shutdown instructions.

i. Operating procedures for emergencies.

j. Operating procedures for system, subsystem, or equipment failure.

k. Seasonal and weekend operating instructions.

l. Required sequences for electric or electronic systems.

m. Special operating instructions and procedures.

5. Adjustments: Include the following:

a. Alignments.

b. Checking adjustments.

c. Noise and vibration adjustments.

d. Economy and efficiency adjustments.

6. Troubleshooting: Include the following:

a. Diagnostic instructions.

b. Test and inspection procedures.

7. Maintenance: Include the following:

a. Inspection procedures.

b. Types of cleaning agents to be used and methods of cleaning.

c. List of cleaning agents and methods of cleaning detrimental to product.

d. Procedures for routine cleaning

e. Procedures for preventive maintenance.

f. Procedures for routine maintenance.
g. Instruction on use of special tools.

8. Repairs: Include the following:
   a. Diagnosis instructions.
   b. Repair instructions.
   c. Disassembly; component removal, repair, and replacement; and reassembly instructions.
   d. Instructions for identifying parts and components.
   e. Review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 PREPARATION
   A. Assemble educational materials necessary for instruction, including documentation and training module. Assemble training modules into a training manual organized in coordination with requirements in Section 01 7823 "Operation and Maintenance Data."

3.2 INSTRUCTION
   A. Facilitator: Engage a qualified facilitator to prepare instruction program and training modules, to coordinate instructors, and to coordinate between Contractor and Owner for number of participants, instruction times, and location.
   B. Engage qualified instructors to instruct Owner's personnel to adjust, operate, and maintain systems, subsystems, and equipment not part of a system.
      1. Owner will furnish an instructor to describe Owner's operational philosophy.
      2. Owner will furnish Contractor with names and positions of participants.
   C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.
      1. Schedule training with Owner with at least seven (7) days' advance notice.
   D. Training Location and Reference Material: Conduct training on-site in the completed and fully operational facility using the actual equipment in-place. Conduct training using final operation and maintenance data submittals.
   E. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a demonstration performance-based test.

3.3 DEMONSTRATION AND TRAINING VIDEO RECORDINGS (Optional)
   A. General: Engage a qualified commercial videographer to record demonstration and training video recordings. Record each training module separately. Include classroom instructions and demonstrations, board diagrams, and other visual aids, but not student practice.
      1. At beginning of each training module, record each chart containing learning objective and lesson outline.
B. Video Recording Format: Provide high-quality color video recordings with menu navigation in format acceptable to Architect.

C. Narration: Describe scenes on video recording by dubbing audio narration off-site after video recording is recorded. Include description of items being viewed.

D. Preproduced Video Recordings: Provide video recordings used as a component of training modules in same format as recordings of live training.

END OF SECTION 01 7900
SECTION 02 4116 - STRUCTURE DEMOLITION

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Demolition and removal of buildings and site improvements.
      2. Removing below-grade construction.
      3. Disconnecting, capping or sealing, and removing site utilities.

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

1.3 INFORMATIONAL SUBMITTALS
   A. Schedule of building demolition with starting and ending dates for each activity.
   B. Predemolition photographs.
   C. If systems containing refrigerant material are encountered, provide Statement of Refrigerant Recovery: Signed by refrigerant recovery technician.

1.4 QUALITY ASSURANCE
   A. Refrigerant Recovery Technician Qualifications: Certified by EPA-approved certification program.
   B. Regulatory Requirements: Comply with governing EPA notification regulations before beginning demolition. Comply with hauling and disposal regulations of authorities having jurisdiction.
   D. Predemolition Conference: Conduct conference at Project site.

1.5 PROJECT CONDITIONS
   A. Buildings to be demolished will be vacated and their use discontinued before start of the Work.
   B. Buildings immediately adjacent to demolition area will be occupied. Conduct building demolition so operations of occupied buildings will not be disrupted.
      1. Provide not less than seventy-two (72) hours' notice of activities that will affect operations of adjacent occupied buildings.
2. Maintain access to existing walkways, exits, and other facilities used by occupants of adjacent buildings.
   a. Do not close or obstruct walkways, exits, or other facilities used by occupants of adjacent buildings without written permission from authorities having jurisdiction.

C. Owner assumes no responsibility for buildings and structures to be demolished.
   1. Conditions existing at time of inspection for bidding purpose will be maintained by Owner as far as practical.

D. Hazardous Materials: It is not expected that hazardous materials will be encountered in the Work.
   1. If materials suspected of containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner. Hazardous materials will be removed by Owner under a separate contract.

E. Arrange demolition schedule so as not to interfere with operations of adjacent occupied buildings.

PART 2 - PRODUCTS

2.1 SOIL MATERIALS
   A. Satisfactory Soils: Comply with requirements in Section 31 2000 "Earth Moving."

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Verify that utilities have been disconnected and capped before starting demolition operations.

3.2 PREPARATION
   A. Refrigerant: Remove refrigerant from mechanical equipment according to 40 CFR 82 and regulations of authorities having jurisdiction before starting demolition.
   B. Existing Utilities: Locate, identify, disconnect, and seal or cap off indicated utilities serving buildings and structures to be demolished.
      1. Arrange to shut off indicated utilities with utility companies.
      2. If removal, relocation, or abandonment of utility services will affect adjacent occupied buildings, then provide temporary utilities that bypass buildings and structures to be demolished and that maintain continuity of service to other buildings and structures.
      3. Cut off pipe or conduit at the property line. Cap, valve, or plug and seal remaining portion of pipe or conduit after bypassing according to requirements of authorities having jurisdiction.
4. Do not start demolition work until utility disconnecting and sealing have been completed.

C. Temporary Shoring: Provide and maintain interior and exterior shoring, bracing, or structural support to preserve stability and prevent unexpected movement or collapse of construction being demolished.

3.3 PROTECTION

A. Existing Facilities: Protect adjacent walkways, loading docks, building entries, and other building facilities during demolition operations. Maintain exits from existing buildings.

B. Existing Utilities: Maintain utility services to remain and protect from damage during demolition operations. Do not interrupt existing utilities serving adjacent occupied or operating facilities unless authorized in writing by Owner and authorities having jurisdiction.

C. Temporary Protection: Erect temporary protection, such as walks, fences, railings, canopies, and covered passageways, where required by authorities having jurisdiction and as indicated. Comply with requirements in Section 01 5000 "Temporary Facilities and Controls."

   1. Protect adjacent buildings and facilities from damage due to demolition activities.
   2. Protect existing site improvements, appurtenances, and landscaping to remain.
   3. Provide temporary barricades and other protection required to prevent injury to people and damage to adjacent buildings and facilities to remain.
   4. Provide protection to ensure safe passage of people around building demolition area and to and from occupied portions of adjacent buildings and structures.
   5. Protect walls, windows, roofs, and other adjacent exterior construction that are to remain and that are exposed to building demolition operations.
   6. Erect and maintain dustproof partitions and temporary enclosures to limit dust, noise, and dirt migration to occupied portions of adjacent buildings.

D. Remove temporary barriers and protections where hazards no longer exist. Where open excavations or other hazardous conditions remain, leave temporary barriers and protections in place.

3.4 DEMOLITION

A. General: Demolish indicated buildings and site improvements completely. Use methods required to complete the Work within limitations of governing regulations.

   1. Do not use cutting torches until work area is cleared of flammable materials. Maintain portable fire-suppression devices during flame-cutting operations.
   2. Maintain fire watch during and for at least six (6) hours after flame cutting operations.
   3. Maintain adequate ventilation when using cutting torches.
   4. Locate building demolition equipment and remove debris and materials so as not to impose excessive loads on supporting walls, floors, or framing.
B. Site Access and Temporary Controls: Conduct building demolition and debris-removal operations to ensure minimum interference with roads, streets, walks, walkways, and other adjacent occupied and used facilities.

1. Do not close or obstruct streets, walks, walkways, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction.

2. Use water mist and other suitable methods to limit spread of dust and dirt. Comply with governing environmental-protection regulations.

C. Explosives: Use of explosives is not permitted.

D. Proceed with demolition of structural framing members systematically, from higher to lower level. Complete building demolition operations above each floor or tier before disturbing supporting members on the next lower level.

E. Demolish foundation walls and other below-grade construction within footprint of new construction and extending 5 feet (1.5 m) outside footprint indicated for new construction.

1. Remove below-grade construction, including basements, foundation walls, and footings, completely.

F. Existing Utilities: Demolish existing utilities and below-grade utility structures within 5 feet (1.5 m) outside footprint indicated for new construction. Cut utilities flush with grade.

G. Below-Grade Areas: Completely fill below-grade areas and voids resulting from building demolition operations with satisfactory soil materials according to backfill requirements in Section 312000 "Earth Moving."

H. Site Grading: Uniformly rough grade area of demolished construction to a smooth surface, free from irregular surface changes. Provide a smooth transition between adjacent existing grades and new grades.

I. Promptly repair damage to adjacent buildings caused by demolition operations.

3.5 CLEANING

A. Remove demolition waste materials from Project site and legally disposed of them in an EPA-approved landfill acceptable to authorities having jurisdiction. See Section 017419 "Construction Waste Management and Disposal" for recycling and disposal of demolition waste.

B. Do not burn demolished materials.

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

END OF SECTION 02 4116
SECTION 03 3000 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 SUMMARY

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

B. Related Requirements:
   1. Section 31 2000 "Earth Moving" for drainage fill under slabs-on-grade.
   2. Section 32 1313 “Concrete Paving”

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:
   1. Product Data for products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include statement indicating cost for each product having recycled content.
   2. Laboratory Test Reports for liquid floor treatments and curing and sealing compounds, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
   3. Design Mixtures for each concrete mixture containing fly ash as a replacement for portland cement or other portland cement replacements, and for equivalent concrete mixtures that do not contain portland cement replacements.

C. Design Mixtures: For each concrete mixture.

D. Steel Reinforcement Shop Drawings: Placing Drawings that detail fabrication, bending, and placement.

1.3 INFORMATIONAL SUBMITTALS

A. Material certificates.

B. Material test reports.

C. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer, detailing fabrication, assembly, and support of formwork.

D. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
1.4 QUALITY ASSURANCE
A. Manufacturer Qualifications: A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
   1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
B. Testing Agency Qualifications: An independent agency qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.

1.5 FIELD CONDITIONS
A. Cold-Weather Placement: Comply with ACI 306.1.
   1. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
B. Hot-Weather Placement: Comply with ACI 301 (ACI 301M).

PART 2 - PRODUCTS

2.1 CONCRETE, GENERAL
A. ACI Publications: Comply with the following unless modified by requirements in the Contract Documents:
   1. **ACI 301 (ACI 301M).**

2.2 FORM-FACING MATERIALS
A. Smooth-Formed Finished Concrete: Form-facing panels that provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.

2.3 STEEL REINFORCEMENT
A. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
B. Plain-Steel Welded-Wire Reinforcement: ASTM A 1064/A 1064M, plain, fabricated from as-drawn steel wire into flat sheets.
D. 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."
2.4 CONCRETE MATERIALS

A. Regional Materials: Concrete shall be manufactured within 500 miles (800 km) of Project site from aggregates and cementitious materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.

B. Cementitious Materials:
   3. Slag Cement: ASTM C 989/C 989M, Grade 100 or 120.

C. Normal-Weight Aggregates: ASTM C 33/C 33M, graded.
   1. Maximum Coarse-Aggregate Size: 1 inch (25 mm) nominal.
   2. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement.


E. Air-Entraining Admixture: ASTM C 260/C 260M.

F. Chemical Admixtures: Certified by manufacturer to be compatible with other admixtures and that do 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.


2.5 WATERSTOPS

A. Flexible Rubber Waterstops: CE CRD-C 513, for embedding in concrete to prevent passage of fluids through joints. Factory fabricate corners, intersections, and directional changes.

2.6 VAPOR RETARDERS

A. Sheet Vapor Retarder: ASTM E 1745, Class A, not less than 15 mils (0.38 mm) thick except with maximum water-vapor permeance of 0.01 perms. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
a. Raven Industries, Inc.  
b. Stego Industries, LLC.

2.7 CURING MATERIALS  
A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.  
B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.  
C. Water: Potable.  
D. Clear, Waterborne, Curing and sealing Compound: nondissipating, certified by curing compound manufacturer to not interfere with bonding of floor covering.  
   1. Curing and sealing compounds shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."  
   2. Ashford Formula™ by Curecrete Distribution, Inc.: 1203 W. Spring Creek Place, Springville, UT 84663-0551  
      a. Phone: 801.489.5663  
      b. Toll Free: 800.998.5664  
      c. Fax: 801.489.3307  
      d. Website: www.ashfordformula.com

2.8 RELATED MATERIALS  

2.9 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 (ACI 301M).  
B. Cementitious Materials: Use fly ash, pozzolan, slag cement, and silica fume as needed to reduce the total amount of portland cement, which would otherwise be used, by not less than 40 percent.  
C. Admixtures: Use admixtures according to manufacturer's written instructions.  
   1. Use 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 w/c ratio below 0.50.

2.10 CONCRETE MIXTURES FOR BUILDING ELEMENTS
A. Normal-Weight Concrete:
   1. Minimum Compressive Strength: 4000 psi (27.6 MPa) at 28 days, or as identified on Structural drawings.
   2. Maximum W/C Ratio: 0.45.
   3. Slump Limit: 3 inches for concrete with verified slump of 2 to 4 inches before adding high-range water-reducing admixture or plasticizing admixture.
   4. Air Content: 5 percent, plus or minus 1.5 percent at point of delivery for 1-1/2-inch (38-mm) nominal maximum aggregate size.
   5. Air Content: Do not allow air content of trowel-finished floors to exceed 3 percent.

2.11 FABRICATING REINFORCEMENT
A. Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."

2.12 CONCRETE MIXING
A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M and ASTM C 1116/C 1116M, 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 INSTALLATION
A. Design, erect, shore, brace, and maintain formwork, according to ACI 301 (ACI 301M), 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 (ACI 117M).
C. Chamfer exterior corners and edges of permanently exposed concrete.

3.2 EMBEDDED ITEM INSTALLATION
A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
3.3 VAPOR-RETARDER INSTALLATION
A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E1643 and manufacturer's written instructions.
   1. Lap joints 6 inches (150 mm) and seal with manufacturer's recommended tape.

3.4 STEEL REINFORCEMENT INSTALLATION
A. General: Comply with CRSI's "Manual of Standard Practice" for fabricating, placing, and supporting reinforcement.
   1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

3.5 JOINTS
A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.
B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.
C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
   1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch (3.2 mm). Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
   2. Sawed Joints: Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8-inch- (3.2-mm-) wide joints into concrete when cutting action does not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.

3.6 WATERSTOP INSTALLATION
A. Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions.

3.7 CONCRETE PLACEMENT
A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections are completed.
B. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete is placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
1. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301 (ACI 301M).

3.8 FINISHING FORMED SURFACES

A. 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, or to be covered with a coating or covering material applied directly to concrete.

B. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.9 FINISHING FLOORS AND SLABS

A. General: Comply with ACI 302.1R recommendations for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.

B. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power-driven floats. Restraighten, cut down high spots, and fill low spots. Repeat float passes and restraightening until surface is left with a uniform, smooth, granular texture.

1. Apply float finish to surfaces to receive trowel finish and to be covered with fluid-applied or sheet waterproofing.

C. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and restraighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.

1. Apply a trowel finish to surfaces to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.

2. Finish and measure surface, so gap at any point between concrete surface and an unleveled, freestanding, 10-ft. (3.05-m) long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/4 inch.

D. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, parking areas, 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.
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 (ACI 301M) 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 remainder of curing period.

D. 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 (7) days.
   2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven (7) days. Immediately repair any holes or tears during curing period, using cover material and waterproof tape.
   3. Curing and Sealing Compound: Prepare slabs in accordance with manufacturer’s written instructions. Apply curing and sealing compound uniformly to floors and slabs indicated in a continuous operation according to manufacturer’s written instructions. The material should be spray-applied at approximately 200 square feet per gallon to achieve a flood coat on the floor surface.

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.

FIELD QUALITY CONTROL

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

END OF SECTION 03 3000
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. LEED Submittals:
      1. Product Certificates for products and materials required to comply with requirements for regional materials and recycled content, certificates indicating location of material manufacturer and point of extraction, harvest, or recovery for each raw material. Include statement indicating distance to Project, and fraction by weight that is considered regional.
   C. 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, and material test reports substantiating compliance with requirements.
   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 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

CONCRETE UNIT MASONRY
by frost or by freezing conditions. Comply with cold-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.
C. Fire-Resistance Ratings: Comply with requirements for fire-resistance-rated assembly designs indicated.
   1. Where fire-resistance-rated construction is indicated, units shall be listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction.

2.2 CONCRETE MASONRY UNITS
A. Regional Materials: CMUs shall be manufactured within 500 miles (800 km) of Project site from aggregates and cement that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
B. Shapes: Provide shapes indicated and as follows, with exposed surfaces matching exposed faces of adjacent units unless otherwise indicated.
   1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.
   2. Unit Compressive Strength: Provide units with minimum average net-area compressive strength of 1500 psi (19.3 MPa).
   3. Density Classification: Normal weight unless otherwise indicated.

2.3 CONCRETE 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.

2.4 MORTAR AND GROUT MATERIALS
A. Regional Materials: Aggregate for mortar and grout, cement and lime shall be extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
B. Portland Cement: ASTM C 150/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.
C. Hydrated Lime: ASTM C 207, Type S.
D. Aggregate for Mortar: ASTM C 144.
E. Aggregate for Grout: ASTM C 404.
F. 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.
G. 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. Reinforcing Bar Positioners: Wire units designed to fit into mortar bed joints spanning masonry unit cells and to hold reinforcing bars in center of cells. Units are formed from 0.148-inch (3.77-mm) steel wire, hot-dip galvanized after fabrication. Provide units designed for number of bars indicated.
C. Masonry-Joint Reinforcement, General: ASTM A 951/A 951M.
   1. Interior Walls: hot dipped-galvanized, carbon steel.
   2. Exterior Walls: Hot-dip galvanized carbon.
   3. Wire Size for Side Rods: 0.148-inch (3.77-mm) diameter.
   4. Wire Size for Cross Rods: 0.148-inch (3.77-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 MISCELLANEOUS MASONRY ACCESSORIES
A. Compressible Filler: Premolded filler strips complying with ASTM D 1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene urethane or PVC.
B. Preformed Control-Joint Gaskets: Made from styrene-butadiene-rubber compound, complying with ASTM D 2000, Designation M2AA-805 or PVC, complying with ASTM D 2287, Type PVC-65406 and designed to fit standard sash block and to maintain lateral stability in masonry wall; size and configuration as indicated.
C. Bond-Breaker Strips: Asphalt-saturated felt complying with ASTM D 226/D 226M, Type I (No. 15 asphalt felt).

2.7 MORTAR AND GROUT MIXES
A. General: Do not use admixtures, including pigments, air-entraining agents, accelerators, retarders, water-repellent agents, antifreeze compounds, or other admixtures unless otherwise indicated.
1. Do not use calcium chloride in mortar or grout.
2. Use portland cement-lime or masonry cement 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, Proportion 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 M.
   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 M.

D. Grout for Unit Masonry: Comply with ASTM C 476.
   1. Use grout of type indicated on Structural drawings 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 3000 psi.
   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 MASONRY-JOINT REINFORCEMENT
A. General: Install entire length of longitudinal side rods in mortar with a minimum cover of 5/8 inch (16 mm) on exterior side of walls, 1/2 inch (13 mm) elsewhere. Lap reinforcement a minimum of 6 inches (150 mm).
1. Space reinforcement not more than 16 inches (406 mm) o.c.
2. Space reinforcement not more than 8 inches (203 mm) o.c. in foundation walls and parapet walls.
3. Provide reinforcement not more than 8 inches (203 mm) above and below wall openings and extending 12 inches (305 mm) beyond openings in addition to continuous reinforcement.

B. Interrupt joint reinforcement at control 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.

3.6 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 1/2 inch (13 mm) 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.

3.7 FLASHING
A. General: Install embedded flashing at ledges and other obstructions to downward flow of water in wall where indicated.
B. Install single-wythe CMU flashing system in bed joints of CMU walls where indicated to comply with manufacturer's written instructions. Install CMU cell pans with upturned edges located below face shells and webs of CMUs above and with weep spouts aligned with face of wall. Install CMU web covers so that they cover upturned edges of CMU cell pans at CMU webs and extend from face shell to face shell.

3.8 REINFORCED UNIT MASONRY INSTALLATION

A. Temporary Formwork and Shores: Construct formwork and shores as needed to support reinforced masonry elements during construction.
   1. Construct formwork to provide shape, line, and dimensions of completed masonry as indicated. Make forms sufficiently tight to prevent leakage of mortar and grout. Brace, tie, and support forms to maintain position and shape during construction and curing of reinforced masonry.
   2. Do not remove forms and shores until reinforced masonry members have hardened sufficiently to carry their own weight and 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) unless otherwise indicated.

3.9 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.
   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.

B. Testing Prior to Construction: One set of tests.

C. Testing Frequency: One set of tests for each 5000 sq. ft. (464 sq. m) of wall area or portion thereof.

D. Concrete Masonry Unit Test: For each type of unit provided, according to ASTM C 140 for compressive strength.

E. Mortar Aggregate Ratio Test (Proportion Specification): For each mix provided, according to ASTM C 780.
F. Mortar Test (Property Specification): For each mix provided, according to ASTM C 780. Test mortar for **mortar air content and compressive strength**.

G. Grout Test (Compressive Strength): For each mix provided, according to ASTM C 1019.

H. Prism Test: For each type of construction provided, according to ASTM C 1314 at **seven days and at 28 days**.

3.10 PARGING

A. Parge exterior faces of below-grade masonry walls, where indicated, in two uniform coats to a total thickness of **3/4 inch (19 mm)**. Dampen wall before applying first coat, and scarify first coat to ensure full bond to subsequent coat.

B. Use a steel-trowel finish to produce a smooth, flat, dense surface with a maximum surface variation of **1/8 inch per foot (3 mm per 300 mm)**. Form a wash at top of parging and a cove at bottom.

C. Damp-cure parging for at least 24 hours and protect parging until cured.

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 the structural frame indicated on Drawings and as described in AISC 303, “Code of Standard Practice for Steel Buildings and Bridges.”

1.3 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.

1.4 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Shop Drawings: Show fabrication of structural-steel components.

1.5 INFORMATIONAL SUBMITTALS
   A. Qualification Data: For Installer fabricator.
   B. Welding certificates.
   C. Mill test reports for structural steel, including chemical and physical properties.
   D. Source quality-control reports.
   E. Owner responsible for retaining qualified testing agency for field quality-control and special inspection reports.

1.6 QUALITY ASSURANCE
   1. Per Structural Drawings.

PART 2 - PRODUCTS

2.1 STRUCTURAL-STEEL MATERIALS
   A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 50 percent.
B. W-Shapes: ASTM A 992/A 992M.
C. Channels, Angles: ASTM A 36/A 36M.
D. Plate and Bar: ASTM A 36/A 36M.
E. Steel Pipe: ASTM A 53/A 53M, Type E or Type S, Grade B.
F. 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.
   1. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with plain finish.

B. High-Strength Bolts, Nuts, and Washers: ASTM A 490 (ASTM A 490M), Type 1, heavy-hex steel structural bolts or tension-control, bolt-nut-washer assemblies with splined ends; 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 with plain finish.
   1. Direct-Tension Indicators: ASTM F 959, Type 490 (ASTM F 959M, Type 10.9), compressible-washer type with plain finish.

C. 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.
   2. Direct-Tension Indicators: ASTM F 959, Type 325 (ASTM F 959M, Type 8.8), compressible-washer type with mechanically deposited zinc coating, baked epoxy-coated finish.

D. Tension-Control, High-Strength Bolt-Nut-Washer Assemblies: ASTM F 1852, Type 1, heavy-hex head assemblies consisting of steel structural bolts with splined ends, heavy-hex carbon-steel nuts, and hardened carbon-steel washers.
   1. Finish: Mechanically deposited zinc coating.

E. Shear Connectors: ASTM A 108, Grades 1015 through 1020, headed-stud type, cold-finished carbon steel; AWS D1.1/D1.1M, Type B.


2.3 PRIMER

A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California

B. Primer: Comply with Section 09 9113 “Exterior Painting” and Section 09 9123 “Interior Painting.”

C. Primer: SSPC-Paint 25, Type II, zinc oxide, alkyd, linseed oil primer.

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

2.4 GROUT

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

2.5 FABRICATION

A. Structural Steel: Fabricate and assemble in shop to greatest extent possible. Fabricate according to AISC 303, “Code of Standard Practice for Steel Buildings and Bridges,” and to AISC 360.

B. 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.

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” for type of bolt and type of joint specified.
   1. Joint Type: Per Structural Drawings.

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 to be field welded.
   4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
   5. Galvanized surfaces.
B. Surface Preparation: Clean surfaces to be painted. Remove loose rust and mill scale and spatter, slag, or flux deposits. Prepare surfaces according to the following specifications and standards:
   1. SSPC-SP 2, "Hand Tool Cleaning."
   2. SSPC-SP 3, "Power Tool Cleaning."
   3. SSPC-SP 7/NACE No. 4, "Brush-off Blast 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.

2.8 SOURCE QUALITY CONTROL

A. Testing Agency: Owner will engage a qualified testing agency to perform shop tests and inspections.
   1. Provide testing agency with access to places where structural-steel work is being fabricated or produced to perform tests and inspections.

B. Bolted Connections: Inspect and test shop-bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325."

C. Welded Connections: Visually inspect shop-welded connections according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
   1. Liquid Penetrant Inspection: ASTM E 165.
   2. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.
   4. Radiographic Inspection: ASTM E 94.

D. Prepare test and inspection reports.

PART 3 - EXECUTION

3.1 EXAMINATION

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

B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 ERECTION

A. Set structural steel accurately in locations and to elevations indicated and according to AISC 303 and AISC 360.
   1. Set plates for structural members on wedges, shims, or setting nuts as required.
   2. Weld plate washers to top of baseplate.
   3. Snug-tighten anchor rods after supported members have been positioned and plumbed. Do not remove wedges or shims but, if protruding, cut off flush with edge of plate before packing with grout.
   4. Promptly pack grout solidly between bearing surfaces and plates so no voids remain. Neatly finish exposed surfaces; protect grout and allow to cure. Comply with manufacturer's written installation instructions for shrinkage-resistant grouts.

C. Maintain erection tolerances of structural steel within AISC 303, "Code of Standard Practice for Steel Buildings and Bridges."

3.3 FIELD CONNECTIONS

A. High-Strength Bolts: Install high-strength bolts according to RCSC's "Specification for Structural Joints Using ASTM A 325 or A 490 Bolts" for type of bolt and type of joint specified.
   1. Joint Type: Per Structural drawings.

B. Weld Connections: Comply with AWS D1.1/D1.1M for tolerances, appearances, welding procedure specifications, weld quality, and methods used in correcting welding work.
   1. Comply with AISC 303 and AISC 360 for bearing, alignment, adequacy of temporary connections, and removal of paint on surfaces adjacent to field welds.
   2. Remove backing bars or runoff tabs, back gouge, and grind steel smooth.

3.4 FIELD QUALITY CONTROL

A. Special Inspections: Owner will engage a qualified special inspector to perform the following special inspections:
   1. Verify structural-steel materials and inspect steel frame joint details.
   2. Verify weld materials and inspect welds.
   3. Verify connection materials and inspect high-strength bolted connections.

B. Bolted Connections: Inspect and test bolted connections according to RCSC's "Specification for Structural Joints Using ASTM A 325 Bolts."

C. Welded Connections: Visually inspect field welds according to AWS D1.1/D1.1M.
   1. In addition to visual inspection, test and inspect field welds according to AWS D1.1/D1.1M and the following inspection procedures, at testing agency's option:
a. Liquid Penetrant Inspection: ASTM E 165.

b. Magnetic Particle Inspection: ASTM E 709; performed on root pass and on finished weld. Cracks or zones of incomplete fusion or penetration are not accepted.

c. Ultrasonic Inspection: ASTM E 164.

d. Radiographic Inspection: ASTM E 94.

END OF SECTION 05 1200
SECTION 05 5000 - METAL FABRICATIONS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Miscellaneous steel framing and supports.
   2. Metal ladders.
   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. Product Data: For the following:
   1. Paint products.
   2. Grout.

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

C. 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 01 4000 "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. Steel Tubing: ASTM A 500/A 500M, cold-formed steel tubing.

D. Steel Pipe: ASTM A 53/A 53M, Standard Weight (Schedule 40) unless otherwise indicated.


F. Aluminum Castings: ASTM B 26/B 26M, Alloy 443.0-F.

2.3 FASTENERS
A. General: Contractor responsible for selecting fasteners that are compatible with substrates and adjoining materials without risk of galvanic action or chemical corrosion. Select fasteners for type, grade, and class required.

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.
   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.


D. Slotted-Channel Inserts: Cold-formed, hot-dip galvanized-steel box channels (struts) complying with MFMA-4, 1-5/8 by 7/8 inches (41 by 22 mm) by length indicated with anchor straps or studs not less than 3 inches (75 mm) long at not more than 8 inches (200 mm) o.c. Provide with temporary filler and tee-head bolts, complete with washers and nuts, all zinc-plated to comply with ASTM B 633, Class Fe/Zn 5, as needed for fastening to inserts.

2.4 MISCELLANEOUS MATERIALS
A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
B. Shop Primers: Provide primers that comply with Section 09.9113 "Exterior Painting." and Section 09.9123 Interior Painting.

C. 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.

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 03.3000 "Cast-in-Place Concrete" for normal-weight, air-entrained, concrete with a minimum 28-day compressive strength of 3000 psi (20 MPa).

2.5 FABRICATION, GENERAL

A. Shop Assembly: Preassemble items in the shop to greatest extent possible. 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 METAL LADDERS
   A. General:
      1. Comply with ANSI A14.3.
   B. Steel Ladders:
      1. Space siderails 16 inches (406 mm) apart unless otherwise indicated.
      2. Siderails: Continuous, 3/8-by-2-1/2-inch (9.5-by-64-mm) flat bars, with eased edges.
      3. Rungs: 3/4-inch- (19-mm-) diameter steel bars.
      4. Fit rungs in centerline of siderails; plug-weld and grind smooth on outer rail faces.
      5. Provide nonslip surfaces on top of each rung.
      6. Prime ladders, including brackets and fasteners.

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. Prime miscellaneous steel trim with zinc-rich primer.

2.9 METAL BOLLARDS
   A. Fabricate metal bollards from Schedule 40 steel pipe as indicated.
   B. Fabricate sleeves for bollard anchorage from steel pipe with 1/4-inch- (6.4-mm-) thick steel plate welded to bottom of sleeve.
   C. 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 unless they are to be embedded in concrete, sprayed-on fireproofing, or masonry, or unless otherwise indicated.
   1. Shop prime with universal shop primer, primers specified in Section 09 9113 "Exterior Painting", primers specified in Section 09 9123 "Interior Painting" unless zinc-rich primer is indicated.
C. Preparation for Shop Priming: Prepare surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning." or 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 metal-capped bollards solidly with concrete and allow concrete to cure seven (7) days before installing.
B. Anchor bollards in concrete with pipe sleeves preset and anchored into concrete. Fill annular space around bollard solidly with nonshrink grout.
C. Fill bollards solidly with concrete, mounding top surface to shed water.

3.3 INSTALLING BEARING AND LEVELING 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.
SECTION 05 5113 - METAL PAN STAIRS

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Preassembled steel stairs with precast concrete treads.
   2. Steel tube railings attached to metal stairs.

1.2 ACTION SUBMITTALS
A. Product Data: For metal pan stairs.
B. LEED Submittals:
   1. Laboratory Test Reports for primers, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health’s (formerly, the California Department of Health Services') “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.”
C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
D. Delegated-Design Submittal: For stairs and railings, 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 01 4000 "Quality Requirements," to design stairs and railings.

B. Structural Performance of Stairs: Metal stairs shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
   2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
   3. Uniform and concentrated loads need not be assumed to act concurrently.
   4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.

C. Structural Performance of Railings: Railings shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:
   1. Handrails and Top Rails of Guards:
      a. Uniform load of 50 lbf/ft. (0.73 kN/m) applied in any direction.
b. Concentrated load of 200 lb (0.89 kN) applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

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

2.2 METALS
A. Metal Surfaces, General: Provide materials with smooth, flat surfaces unless otherwise indicated. For components exposed to view in the completed Work, provide materials without seam marks, roller marks, rolled trade names, or blemishes.
B. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
C. Steel Tubing: ASTM A 500 (cold formed) or ASTM A 513.
D. Designations in "Style Designation" Subparagraph below indicate size. First option has openings approximately 3/4 by 1-1/2 inches (20 by 40 mm) and is 0.09 to 0.10 inch (2.3 to 2.5 mm) thick; second option has openings approximately 1 by 2-1/2 inches (25 by 65 mm) and is 0.13 to 0.142 inch (3.3 to 3.6 mm) thick.
E. Woven-Wire Mesh: Intermediate-crimp square pattern, 4-inch woven-wire mesh, made from 0.135-inch (3.5-mm) nominal diameter wire complying with ASTM A 510 (ASTM A 510M).

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

2.4 MISCELLANEOUS MATERIALS
A. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
B. Shop Primers: Provide primers that comply with Section 09 9113 "Exterior Painting"
C. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.
D. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.

2.5 PRECAST CONCRETE TREADS
A. Concrete Materials and Properties: Comply with requirements in Section 03 3000 "Cast-in-Place Concrete" for normal-weight, ready-mixed concrete with a minimum 28-day compressive strength of 5000 psi (35 MPa) and a total air content of not less than 4 percent or more than 6 percent.
B. Reinforcement: Galvanized, welded wire reinforcement, 2 by 2 inches (50 by 50 mm) by 0.062-inch- (1.6-mm-) diameter wire; comply with ASTM A 185/A 185M and ASTM A 82/A 82M, except for minimum wire size.

2.6 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, struts, railings, clips, brackets, bearing plates, and other components necessary to support and anchor stairs and platforms on supporting structure.
   1. Join components by welding unless otherwise indicated.
   2. Use connections that maintain structural value of joined pieces.

B. Preassembled Stairs: Assemble stairs in shop to greatest extent possible. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form bent-metal corners to smallest radius possible without causing grain separation or otherwise impairing work.

E. Weld connections to comply with the following:
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove welding flux immediately.
   4. Weld exposed corners and seams continuously unless otherwise indicated.
   5. At exposed connections, finish exposed welds to comply with NOMMA’s “Voluntary Joint Finish Standards” for Type 3 welds: partially dressed weld with spatter removed.

F. Form exposed connections with hairline joints, flush and smooth, using concealed fasteners where possible. Locate joints where least conspicuous.

2.7 STEEL-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," Commercial Class, unless more stringent requirements are indicated.

B. Stair Framing:
   1. Fabricate stringers of steel plates or channels.
      a. Provide closures for exposed ends of channel stringers.
   2. Construct platforms of steel plate or channel headers and miscellaneous framing members as needed to comply with performance requirements.
3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers. If using bolts, fabricate and join so bolts are not exposed on finished surfaces.

2.8 STAIR RAILINGS

A. Steel Tube Railings: Fabricate railings to comply with requirements indicated for design, dimensions, details, finish, and member sizes, including wall thickness of tube, post spacings, and anchorage, but not less than that needed to withstand indicated loads.

1. Rails and Posts: **1-1/2-inch- (38-mm-) square** top and bottom rails and **1-1/2-inch- (38-mm-) square** posts.

2. Picket Infill: **1/2-inch- (13-mm-) square** pickets spaced less than 4 inches (100 mm) clear.

3. Option: Mesh Infill: Woven wire mesh crimped into **1 by 1/2 by 1/8 inch (25 by 13 by 3 mm)** steel channel frames. Orient wire mesh as shown on drawings.

B. Welded Connections: Fabricate railings with welded connections. Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.

1. Finish welds to comply with NOMMA's "Voluntary Joint Finish Standards" for Type 3 welds: partially dressed weld with spatter removed as shown in NAAMM AMP 521.

C. Form changes in direction of railings with welded mitered cuts.

D. Close exposed ends of railing members with welded plate.

E. Provide wall returns at ends of wall-mounted handrails.

F. Connect posts to stair framing by direct welding.

G. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, end closures, flanges, miscellaneous fittings, and anchors for interconnecting components and for attaching to other work.

H. Fillers: Provide fillers made from steel plate, or other suitably crush-resistant material, where needed to transfer wall bracket loads through wall finishes to structural supports. Size fillers to suit wall finish thicknesses.

2.9 FINISHES

A. Finish metal stairs after assembly.

B. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 3, "Power Tool Cleaning."

C. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.
PART 3 - EXECUTION

3.1 INSTALLING METAL PAN STAIRS

A. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

B. Install metal stairs by welding stair framing to steel structure or to weld plates cast into concrete unless otherwise indicated.

C. Fit exposed connections accurately together to form hairline joints. Weld connections that are not to be left as exposed joints.

D. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

E. Place and finish concrete fill for treads and platforms to comply with Section 03 3000 "Cast-in-Place Concrete."

3.2 INSTALLING RAILINGS

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

   1. Anchor posts to steel by welding or bolting to steel supporting members.

   2. Anchor handrail ends to concrete and masonry with steel flanges welded to rail ends and anchored with postinstalled anchors and bolts.

B. Attach handrails to wall with wall brackets. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads. Secure wall brackets to building construction as required to comply with performance requirements.

3.3 ADJUSTING AND CLEANING

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

END OF SECTION 05 5113
SECTION 05 5213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Steel tube railings.
   B. Related Requirements:
      1. Section 05 5113 "Metal Pan Stairs" for steel tube railings associated with metal grating stairs.

1.2 ACTION SUBMITTALS
   A. Product Data: For the following:
      1. Manufacturer's product lines of mechanically connected railings.
      2. Railing brackets.
      4. Laboratory Test Reports for primers, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
   B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   C. Samples: For each type of exposed finish required.
   D. Delegated-Design Submittal: For railings, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.3 INFORMATIONAL SUBMITTALS
   A. Product Test Reports: For pipe and tube railings, for tests performed by a qualified testing agency, according to ASTM E 894 and ASTM E 935.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Steel Pipe and Tube Railings:

2.2 PERFORMANCE REQUIREMENTS
   A. Delegated Design: Engage a qualified professional engineer, as defined in Section 01 4000 "Quality Requirements," to design railings, including attachment to building construction.
B. Structural Performance: Railings, including attachment to building construction, shall withstand the effects of gravity loads and the following loads and stresses within limits and under conditions indicated:

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

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

2.3 METALS, GENERAL
A. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.4 STEEL AND IRON
A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.
B. Plates, Shapes, and Bars: ASTM A 36/A 36M.

2.5 FASTENERS
A. General: Provide the following:
   1. Ungalvanized-Steel Railings: Plated steel fasteners complying with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5 for zinc coating.
   2. Hot-Dip Galvanized Railings: Type 304 stainless-steel or hot-dip zinc-coated steel fasteners complying with ASTM A 153/A 153M or ASTM F 2329 for zinc coating.

2.6 MISCELLANEOUS MATERIALS
A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.
B. Low-Emitting Materials: Paints and coatings shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
C. Etching Cleaner for Galvanized Metal: Complying with MPI#25.
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. Shop Primers: Provide primers that comply with Section 09 9113 "Exterior Painting"
F. Universal Shop Primer: Fast-curing, lead- and chromate-free, universal modified-alkyd primer complying with MPI#79 and compatible with topcoat.

G. 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.

2.7 FABRICATION

A. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch (1 mm) unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

B. Form work true to line and level with accurate angles and surfaces.

C. Welded Connections: Cope components at connections to provide close fit, or use fittings designed for this purpose. Weld all around at connections, including at fittings.
   1. Use materials and methods that minimize distortion and develop strength and corrosion resistance of base metals.
   2. Obtain fusion without undercut or overlap.
   3. Remove flux immediately.
   4. At exposed connections, finish exposed surfaces smooth and blended so no roughness shows after finishing and welded surface matches contours of adjoining surfaces.

D. Nonwelded Connections: Connect members with concealed mechanical fasteners and fittings. Fabricate members and fittings to produce flush, smooth, rigid, hairline joints.

E. Form changes in direction [by bending] [or] [by inserting prefabricated elbow fittings].

F. Close exposed ends of railing members with welded plate.

G. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated.

H. Brackets, Flanges, Fittings, and Anchors: Provide wall brackets, flanges, miscellaneous fittings, and anchors to interconnect railing members to other work unless otherwise indicated.
   1. At brackets and fittings fastened to plaster or gypsum board partitions, provide crush-resistant fillers or other means to transfer loads through wall finishes to structural supports and prevent bracket or fitting rotation and crushing of substrate.

2.8 STEEL AND IRON FINISHES

A. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."

B. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.
C. Baked-Enamel or Powder-Coat Finish: AAMA 2603 except with a minimum dry film thickness of 1.5 mils (0.04 mm). Comply with coating manufacturer’s written instructions for cleaning, conversion coating, and applying and baking finish.

1. Color and Gloss: As selected by Architect from manufacturer’s full range.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that are coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.

2. Set posts plumb within a tolerance of 1/16 inch in 3 feet (2 mm in 1 m).

3. Align rails so variations from level for horizontal members and variations from parallel with rake of steps and ramps for sloping members do not exceed 1/4 inch in 12 feet (6 mm in 3.5 m).

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

3.2 ATTACHING RAILINGS

A. Attach railings to wall with wall brackets, except where end flanges are used. Locate brackets as indicated or, if not indicated, at spacing required to support structural loads.

B. Secure wall brackets and railing end flanges to building construction as follows:

1. For concrete and solid masonry anchorage, use drilled-in expansion shields and hanger or lag bolts.

2. For hollow masonry anchorage, use toggle bolts.

3. For wood stud partitions, use hanger or lag bolts set into studs or wood backing between studs. Coordinate with carpentry work to locate backing members.

3.3 ADJUSTING AND CLEANING

A. Touchup Painting: Immediately after erection, clean field welds, bolted connections, and abraded areas of shop paint, and paint exposed areas with the same material as used for shop painting to comply with SSPC-PA 1 requirements 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 5213
SECTION 06 1000 - ROUGH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Framing with dimension lumber.
   2. Framing with engineered wood products.
   3. Shear wall panels.
   4. Rooftop equipment bases and support curbs.
   5. Wood blocking and nailers.
   7. Plywood backing panels.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of process and factory-fabricated product.
   1. Include data for wood-preservative treatment from chemical treatment manufacturer
      and certification by treating plant that treated materials comply with requirements
B. LEED Submittals:
   1. Product Data for composite wood products, documentation indicating that product
      contains no urea formaldehyde.
   2. Laboratory Test Reports for composite-wood products, documentation indicating that
      products comply with the testing and product requirements of the California
      Department of Health Services' "Standard Practice for the Testing of Volatile Organic
      Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.3 INFORMATIONAL SUBMITTALS
A. 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.
B. Evaluation Reports: For the following, from ICC-ES:
   1. Engineered wood products.
   2. Shear panels.
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 rule-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. Provide dressed lumber, S4S, unless otherwise indicated.

B. Maximum Moisture Content of Lumber: 15 percent for 2-inch nominal (38-mm actual) thickness or less, 19 percent for more than 2-inch nominal (38-mm actual) thickness unless otherwise indicated.

C. 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: AWPA U1; Use Category UC2 for interior construction not in contact with the ground, Use Category UC3b for exterior construction not in contact with the ground, and Use Category UC4a for items in contact with the ground.

1. Preservative Chemicals: Acceptable to authorities having jurisdiction and containing no arsenic or chromium.

B. Kiln-dry lumber after treatment to a maximum moisture content of 19 percent. Do not use material that is warped or that 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 (460 mm) 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. Non-Load-Bearing Interior Partitions: No. 2 grade.
      1. Application: All interior partitions.
      2. Species:
         a. Hem-fir (north); NLGA.
         b. Southern pine; SPIB.
         c. Douglas fir-larch; WCLIB or WWPA.
   B. Framing Other Than Non-Load-Bearing Interior Partitions: No. 2 grade.
      1. Application: Framing other than interior partitions.
      2. Species:
         a. Hem-fir (north); NLGA.
         b. Southern pine; SPIB.
         c. Douglas fir-larch; WCLIB or WWPA.

2.4 ENGINEERED WOOD PRODUCTS
   A. Engineered Wood Products, General: Products shall contain no urea formaldehyde or
      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."
   B. 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.
      1. See Structural General notes for material properties.

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.
      5. Furring.
   B. For items of dimension lumber size, provide No. 2 grade lumber of any species.
   C. For concealed boards, provide lumber with fifteen (15) percent maximum moisture content
      and any of the following species and grades:
      1. Mixed southern pine; No. 2 grade; SPIB.
2. Eastern softwoods; No. 2 grade; NeLMA.
3. Northern species; No. 2 grade; NLGA.
4. Western woods; No. 2 Common grade; WCLIB or WWPA.

2.6 PLYWOOD BACKING PANELS
A. Equipment Backing Panels: DOC PS 1, Exterior, C-C Plugged, in thickness indicated or, if not indicated, not less than 3/4-inch (19-mm) nominal thickness.
   1. Plywood 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."

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 or of Type 304 stainless steel.
C. Bolts: Steel bolts complying with ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with ASTM A 563 (ASTM A 563M) hex nuts and, where indicated, flat washers.

2.8 METAL FRAMING ANCHORS
A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Simpson Strong-Tie Co., Inc.
B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of basis-of-design products. 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.
   1. Use for interior locations unless otherwise indicated.
D. Hot-Dip, Heavy-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); G185 (Z550) coating designation; and not less than 0.036 inch (0.9 mm) thick.
   1. Use for wood-preservative-treated lumber and where indicated.
2.9 MISCELLANEOUS MATERIALS

A. Sill-Sealer Gaskets: Closed-cell neoprene foam, 1/4 inch (6.4 mm) thick, selected from manufacturer's standard widths to suit width of sill members indicated.

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

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. 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, grounds, and similar supports to comply with requirements for attaching other construction.

B. Framing Standard: Comply with AF&PA's WCD 1, "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 anchors to comply with manufacturer's written instructions. Install fasteners through each fastener hole.

E. Do not splice structural members between supports unless otherwise indicated.

F. Comply with AWPA M4 for applying field treatment to cut surfaces of preservative-treated lumber.

G. Where wood-preservative-treated lumber is installed adjacent to metal decking, install continuous flexible flashing separator between wood and metal decking.

H. 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 or per the fastening schedule in the Structural Drawings whichever is more stringent.

3.2 PROTECTION

A. Protect rough carpentry from weather. If, despite protection, rough carpentry becomes sufficiently wet that moisture content exceeds that specified, apply EPA-registered borate treatment. Apply borate solution by spraying to comply with EPA-registered label.

END OF SECTION 06 1000
SECTION 06 1600 - SHEATHING

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Wall sheathing.
   2. Roof sheathing.
   4. Underlayment.
   5. Sheathing joint and penetration treatment.

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.

B. LEED Submittals:
   1. Product Data for adhesives, documentation including printed statement of VOC content.
   2. Product Data for composite wood products, documentation indicating that product contains no urea formaldehyde.

1.3 INFORMATIONAL SUBMITTALS
A. Evaluation Reports: For following products, from ICC-ES:
   1. Preservative-treated plywood.
   2. Foam-plastic sheathing.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. Fire-Test-Response Characteristics: For assemblies with fire-resistance ratings, provide materials and construction identical to those of assemblies tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.
2.2 WOOD PANEL PRODUCTS
   A. Emissions: Products shall 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."
   B. Plywood: Either DOC PS 1 or DOC PS 2 unless otherwise indicated.
   C. Oriented Strand Board: DOC PS 2.

2.3 PRESERVATIVE-TREATED PLYWOOD
   A. Preservative Treatment by Pressure Process: AWPA U1; Use Category UC2 for interior construction, Use Category UC3b for exterior construction.
   B. Mark plywood with appropriate classification marking of an inspection agency acceptable to authorities having jurisdiction.
   C. Application: Treat items indicated on Drawings and plywood in contact with masonry or concrete or used with roofing, flashing, vapor barriers, and waterproofing.

2.4 WALL SHEATHING
   A. Plywood Wall Sheathing: Exposure 1 sheathing.
   B. Oriented-Strand-Board Wall Sheathing: Exposure 1 sheathing.
   C. Glass-Mat Gypsum Wall Sheathing: ASTM C 1177/1177M.
      1. Type and Thickness: Type X, 5/8 inch (15.9 mm) thick.
   D. Cementitious Backer Units: ASTM C 1325, Type A.
      1. Thickness: 5/8 inch (15.9 mm) as indicated.

2.5 ROOF SHEATHING
   A. Plywood Roof Sheathing: Exposure 1 sheathing.
   B. Oriented-Strand-Board Roof Sheathing: Exposure 1 sheathing.

2.6 SUBFLOORING AND UNDERLAYERMENT
   A. Plywood Combination Subfloor-Underlayment: DOC PS 1 or PS 2, Exposure 1, Underlayment single-floor panels.
   B. Oriented-Stand-Board Combination Subfloor-Underlayment: DOC PS 2 or APA PRP-106, Exposure 1 single-floor panels.

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. For roof and wall sheathing, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel.

2.8 SHEATHING JOINT-AND-PENETRATION TREATMENT MATERIALS

A. Sealant for Paper-Surfaced Glass-Mat Gypsum Sheathing: Elastomeric, medium-modulus, neutral-curing silicone joint sealant compatible with joint substrates formed by gypsum sheathing and other materials, recommended by sheathing manufacturer for application indicated and complying with requirements for elastomeric sealants specified in Section 07 9200 "Joint Sealants."

B. Sealant for Glass-Mat Gypsum Sheathing: Silicone emulsion sealant complying with ASTM C 834, compatible with sheathing tape and sheathing and recommended by tape and sheathing manufacturers for use with glass-fiber sheathing tape and for covering exposed fasteners.

1. Sheathing Tape: Self-adhering glass-fiber tape, minimum 2 inches (50 mm) wide, 10 by 10 or 10 by 20 threads/inch (390 by 390 or 390 by 780 threads/m), of type recommended by sheathing and tape manufacturers for use with silicone emulsion sealant in sealing joints in glass-mat gypsum sheathing and with a history of successful in-service use.

C. Sheathing Tape for Foam-Plastic Sheathing: Pressure-sensitive plastic tape recommended by sheathing manufacturer for sealing joints and penetrations in sheathing.

2.9 MISCELLANEOUS MATERIALS

A. Adhesives for Field Gluing Panels to Framing: Formulation complying with APA AFG-01 and ASTM D 3498 that is approved for use with type of construction panel indicated by manufacturers of both adhesives and panels.

1. Adhesives shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

2. Adhesives shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

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" or the fastening schedule in the structural drawings whichever is more restrictive.

D. Coordinate wall and roof 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.

3.2 WOOD STRUCTURAL PANEL INSTALLATION


B. Fastening Methods: Fasten panels as indicated below:

1. Combination Subfloor-Underlayment:
   a. Base Bid: Nail to wood framing.
   b. Additive Alternate: Glue and screw to wood framing.
   c. Space panels 1/16 inch (6 mm) apart at edges and ends.
   d. Fill and sand edge joints of underlayment receiving resilient flooring or troweled surfacing immediately before installing flooring.

2. Wall and Roof Sheathing:
   a. Nail to wood framing. Apply a continuous bead of glue to framing members at edges of wall sheathing panels.
   b. Screw to cold-formed metal framing.
   c. Space panels 1/8 inch (3 mm) apart at edges and ends.

3.3 GYPSUM SHEATHING INSTALLATION

A. Comply with GA-253 and with manufacturer's written instructions.

1. Fasten gypsum sheathing to wood framing with screws.

2. Fasten gypsum sheathing to cold-formed metal framing with screws.

3. Install boards with a 3/8-inch (9.5-mm) gap where non-load-bearing construction abuts structural elements.

4. Install boards with a 1/4-inch (6.4-mm) gap where they abut masonry or similar materials that might retain moisture, to prevent wicking.

B. Seal sheathing joints according to sheathing manufacturer's written instructions.

1. Apply elastomeric sealant to joints and fasteners and trowel flat. Apply sufficient amount of sealant to completely cover joints and fasteners after troweling. Seal other penetrations and openings.

2. Apply glass-fiber sheathing tape to glass-mat gypsum sheathing joints and apply and trowel silicone emulsion sealant to embed entire face of tape in sealant. Apply sealant
to exposed fasteners with a trowel so fasteners are completely covered. Seal other penetrations and openings.

END OF SECTION 06 1600
SECTION 06 1753 - SHOP-FABRICATED WOOD TRUSSES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Wood roof trusses.
   2. Wood floor trusses.
   3. Wood girder trusses.
   4. Wood truss bracing.
   5. Metal truss accessories.

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 of permanent bracing required to prevent buckling of individual truss members due to design loads.
   4. Indicate locations, sizes, and materials for permanent bracing required to prevent buckling of individual truss members due to design loads.
   5. Indicate type, size, material, finish, design values, orientation, and location of metal connector plates.
   6. 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 INFORMATIONAL SUBMITTALS

A. Product certificates.
B. Evaluation Reports: For the following, from ICC-ES:
   1. Metal-plate connectors.
   2. Metal truss accessories.
1.4 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 that complies with quality-control procedures in TPI 1 and that involves third-party inspection by an independent testing and inspecting agency acceptable to Architect and authorities having jurisdiction.

1.5 DELIVERY, STORAGE, AND HANDLING
   A. Handle and store trusses to comply with recommendations in TPI 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 01 4000 "Quality Requirements," to design metal-plate-connected wood trusses.
   B. Structural Performance: Provide metal-plate-connected wood trusses capable of withstanding design loads within limits and under conditions indicated. Comply with requirements in TPI 1 unless more stringent requirements are specified below.

2.2 DIMENSION LUMBER
   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. Provide dry lumber with fifteen (15) percent maximum moisture content at time of dressing.
   B. Permanent Bracing: Provide wood bracing that complies with requirements for miscellaneous lumber in Section 06 1000 "Rough Carpentry."

2.3 METAL CONNECTOR PLATES
   A. General: Fabricate connector plates to comply with TPI 1.
B. 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, made from pressure-preservative treated wood, or in area of high relative humidity, provide fasteners with hot-dip zinc coating complying with ASTM A 153/A 153M or of Type 304 stainless steel.
B. Nails, Brads, and Staples: ASTM F 1667.

2.5 METAL FRAMING ANCHORS AND ACCESSORIES
A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Simpson Strong-Tie Co., Inc.
B. Allowable Design Loads: Provide products with allowable design loads, as published by manufacturer, that meet or exceed those of basis-of-design products. 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.

2.6 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.
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. Securely connect each truss ply required for forming built-up girder trusses.

G. 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.”
   2. Install and fasten strongback bracing vertically against vertical web of parallel-chord floor trusses at centers indicated.

H. Install wood trusses within installation tolerances in TPI 1.

I. Do not alter trusses in field. Do not cut, drill, notch, or remove truss members.

J. Replace wood trusses that are damaged or do not meet requirements.

END OF SECTION 06 1753
SECTION 06 1800 - GLUED-LAMINATED CONSTRUCTION

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes framing using structural glued-laminated timber.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. LEED Submittals:
   1. Laboratory Test Reports for laminating adhesive, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
   2. Laboratory Test Reports for sealers, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
   3. Product Data for laminating adhesive, documentation indicating that product contains no urea formaldehyde.

1.3 INFORMATIONAL SUBMITTALS
A. Certificates of Conformance: Issued by a qualified testing and inspecting agency indicating that structural glued-laminated timber complies with requirements in AITC A190.1.

1.4 QUALITY ASSURANCE
A. Manufacturer Qualifications: An AITC- or APA-EWS-licensed firm

1.5 DELIVERY, STORAGE, AND HANDLING
A. General: Comply with provisions in AITC 111.
B. Individually wrap members using plastic-coated paper covering with water-resistant seams.
PART 2 - PRODUCTS

2.1 STRUCTURAL GLUED-LAMINATED TIMBER

A. General: Provide structural glued-laminated timber that complies with AITC A190.1 and AITC 117 or research/evaluation reports acceptable to authorities having jurisdiction.
   1. Factory mark each piece of structural glued-laminated timber with AITC Quality Mark or APA-EWS trademark. Place mark on surfaces that are not exposed in the completed Work.
   2. Provide structural glued-laminated timber made with wet-use adhesive complying with AITC A190.1.
   3. Adhesive shall not contain urea-formaldehyde resins.
   4. Adhesives shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Regional Materials: Glued-laminated timber shall be manufactured within 500 miles (800 km) of Project site from wood that has been harvested and milled within 500 miles (800 km) of Project site.

C. Species and Grades for Structural Glued-Laminated Timber: Any species that complies with structural properties and beam stress classifications indicated.

D. Grades for Beams:

E. Appearance Grade: Industrial or Framing, complying with AITC 110.

2.2 TIMBER CONNECTORS

A. Basis-of-Design Product: Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:
   1. Simpson Strong-Tie Co., Inc.

B. Materials: Unless otherwise indicated, fabricate from the following materials:
   1. Structural-steel shapes, plates, and flat bars complying with ASTM A 36/A 36M.
   2. Round steel bars complying with ASTM A 575, Grade M 1020.
   3. Hot-rolled steel sheet complying with ASTM A 1011/A 1011M, Structural Steel, Type SS, Grade 33.

C. Finish steel assemblies and fasteners with rust-inhibitive primer, 2-mil (0.05-mm) dry film thickness.
   1. Primer shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

D. Hot-dip galvanize steel assemblies and fasteners after fabrication to comply with ASTM A 123/A 123M or ASTM A 153/A 153M.
2.3 MISCELLANEOUS MATERIALS
   A. End Sealer: Manufacturer's standard, transparent, colorless wood sealer that is effective in retarding the transmission of moisture at cross-grain cuts and is compatible with indicated finish.
   B. Penetrating Sealer: Manufacturer's standard, transparent, penetrating wood sealer that is compatible with indicated finish.
   C. Sealers shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.4 FABRICATION
   A. Camber: Fabricate horizontal and inclined members of less than 1:1 slope with either circular or parabolic camber equal to 1/500 of span.
   B. End-Cut Sealing: Immediately after end cutting each member to final length, apply a saturation coat of end sealer to ends and other cross-cut surfaces, keeping surfaces flood coated for not less than 10 minutes.
   C. Seal Coat: After fabricating, sanding, and end-coat sealing, apply a heavy saturation coat of penetrating sealer on surfaces of each unit.

PART 3 - EXECUTION

3.1 INSTALLATION
   A. General: Erect structural glued-laminated timber true and plumb and with uniform, close-fitting joints. Provide temporary bracing to maintain lines and levels until permanent supporting members are in place.
   B. Cutting: Avoid extra cutting after fabrication. Where field fitting is unavoidable, comply with requirements for shop fabrication.

3.2 ADJUSTING
   A. Repair damaged surfaces after completing erection. Replace damaged structural glued-laminated timber if repairs are not approved by Architect.

3.3 PROTECTION
   A. Do not remove wrappings on individually wrapped members until they no longer serve a useful purpose, including protection from weather, sunlight, soiling, and damage from work of other trades.
      1. Slit underside of wrapping to prevent accumulation of moisture inside the wrapping.

END OF SECTION 06 1800
SECTION 06 2023 - INTERIOR FINISH CARPENTRY

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Interior trim.
B. Related Requirements:

1.2 ACTION SUBMITTALS
A. Product Data: For each type of process and factory-fabricated product.
B. LEED Submittals:
   1. Product Data for adhesives and glues used at Project site, documentation including printed statement of VOC content.
   2. Product Data composite wood products, documentation indicating that product contains no urea formaldehyde.
   3. Laboratory Test Reports for adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
   4. Laboratory Test Reports for composite wood products, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL
A. Low-Emitting Materials: Composite wood products shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 INTERIOR TRIM
A. Moldings for Opaque Finish (Painted Finish): Made to patterns included in WMMPA WM 12.
   1. Material: Primed MDF.
B. Molding Patterns:
1. Base Pattern: 1/2-by-3-1/4-inch (13-by-83-mm) rectangular section with 1/16 inch chamfer.

2.3 MISCELLANEOUS MATERIALS
   
   A. Low-Emitting Materials: Adhesives shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

   B. Glue: Aliphatic-resin, polyurethane, or resorcinol wood glue recommended by manufacturer for general carpentry use.
      
      1. Wood glue shall have a VOC content of 30 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
      
      2. Adhesive shall have a VOC content of 50 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

PART 3 - EXECUTION

3.1 PREPARATION
   
   A. Before installing interior finish carpentry, condition materials to average prevailing humidity in installation areas for a minimum of 24 hours unless longer conditioning is recommended by manufacturer.

3.2 INSTALLATION, GENERAL
   
   A. Install interior finish carpentry level, plumb, true, and aligned with adjacent materials. Use concealed shims where necessary for alignment.
      
      1. Scribe and cut interior finish carpentry to fit adjoining work. Refinish and seal cuts as recommended by manufacturer.
      
      2. Countersink fasteners, fill surface flush, and sand unless otherwise indicated.
      
      3. Install to tolerance of 1/8 inch in 96 inches (3 mm in 2438 mm) for level and plumb. Install adjoining interior finish carpentry with 1/32-inch (0.8-mm) maximum offset for flush installation and 1/16-inch (1.5-mm) maximum offset for reveal installation.

3.3 STANDING AND RUNNING TRIM INSTALLATION
   
   A. Install with minimum number of joints practical, using full-length pieces from maximum lengths of lumber available. Miter at returns, miter at outside corners, and cope at inside corners to produce tight-fitting joints with full-surface contact throughout length of joint. Use scarf joints for end-to-end joints.

END OF SECTION 06 2023
SECTION 06 4113 - WOOD-VENEER-FACED ARCHITECTURAL CABINETS

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Architectural wood cabinets.
   2. Cabinet shelves.
   3. Wood furring, blocking, shims, and hanging strips for installing architectural wood cabinets unless concealed within other construction before cabinet installation.
   4. Shop finishing of architectural wood cabinets.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product, including, panel products, fire-retardant-treated materials, cabinet hardware and accessories, and finishing materials and processes.
B. LEED Submittals: Product Data for Credit MR 2.2: All composite wood products shall contain no added urea-formaldehyde. Particle board and medium density fiberboard (MDF) shall be in certified compliance with ANSI A208.1 and A208.2. Alternative compliance path is California Air Resources Board (CARB) product approval on formaldehyde emissions from composite wood products. All particleboard, medium density fiberboard (MDF), thin MDF, hardwood plywood with a veneer core, and hardwood plywood with a composite core shall be “CARB” approved.
   1. Laboratory Test Reports: For adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services’ “Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers.”
   2. Laboratory Test Reports: For sealers, documentation indicating that products comply with Clear wood finishes meet < 350 g/l for varnish and < 550 g/l for lacquer and Clear wood finishes meet the South Coast Air Quality Management District Rule 1113, Architectural Coatings
C. Shop Drawings: Show location of each item, dimensioned plans and elevations, large scale details, attachment devices and other components
D. Samples:
   1. Lumber for transparent finish, for each species and cut, finished on one side and one edge.
   2. Veneer leaves representative of and selected from flitches to be used for transparent-finished cabinets.
   3. Lumber and panel products with shop-applied opaque finish, for each finish system and color, with exposed surface finished.
4. Thermoset decorative panels, for each color, pattern, and surface finish.
5. Exposed cabinet hardware and accessories, one unit for each type ½” diameter bar pull with a satin nickel finish

1.3 INFORMATIONAL SUBMITTALS
A. Woodwork Quality Standard Compliance Certificates.

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

PART 2 - PRODUCTS

2.1 ARCHITECTURAL WOOD CABINETS, GENERAL
A. Quality Standard: Unless otherwise indicated, comply with the "Architectural Woodwork Standards" for grades of architectural wood cabinets indicated for construction, finishes, installation, and other requirements.
B. Low-Emitting Materials: Composite wood products shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 CABINET BOXES AND SHELVES
A. Melamine-Faced MDF: ANSI A208.2 and A208.1, made with binder containing no urea-formaldehyde resin. or Alternative compliance path California Air Resources Board product approval on formaldehyde emissions from composite wood products; finished on inside faces with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.
  2. Shelving made from material 3/4 inch thick, with applied-PVC front edge.

2.3 WOOD CABINETS FOR TRANSPARENT FINISH
A. Grade: Custom
B. Type of Construction: Frameless
C. Cabinet and Door and Drawer Front Interface Style: Flush overlay
D. Reveal Dimension: 1/2 inch
E. Wood for Exposed Surfaces:
  1. Species: Maple
2. Cut: Plain sliced/plain sawn
F. Semiexposed Surfaces: Provide surface materials indicated below:
   1. Surfaces Other Than Drawer Bodies: Same species and cut indicated for exposed surfaces.

2.4 WOOD MATERIALS
A. Wood Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
   1. Wood Moisture Content: 4 to 9 percent.
B. Composite Wood and Agrifiber Products: Provide materials that comply with requirements of referenced quality standard for each type of woodwork and quality grade specified unless otherwise indicated.
   1. Medium-Density Fiberboard: ANSI A208.2, Grade 130 made with binder containing no urea formaldehyde.
   3. Thermoset Decorative Panels: Particleboard or medium-density fiberboard finished with thermally fused, melamine-impregnated decorative paper and complying with requirements of NEMA LD 3, Grade VGL, for test methods 3.3, 3.4, 3.6, 3.8, and 3.10.

2.5 CABINET HARDWARE AND ACCESSORIES
A. General: Provide cabinet hardware and accessory materials associated with architectural cabinets except for items specified in Section 08 7111 “Door Hardware (Descriptive Specification).”
B. Frameless Concealed Hinges (European Type): BHMA A156.9, B01602, 110 degrees of opening
C. Back-Mounted Pulls: BHMA A156.9, B02011.
D. Bar Pulls: Back mounted, solid metal 4 inches long, 3/8 inch in diameter, and 2-1/2 inches deep.
E. Catches: [Magnetic catches, BHMA A156.9, B03141] [Roller catches, BHMA A156.9, B03071] [Ball friction catches, BHMA A156.9, B03013].
F. Adjustable Shelf Standards and Supports: [BHMA A156.9, B04071; with shelf rests, B04081] [BHMA A156.9, B04102; with shelf brackets, B04112].
G. Drawer Slides: BHMA A156.9.
   1. Grade 1: Side mounted and extending under bottom edge of drawer; full-extension type; zinc-plated steel with polymer rollers.
2. For drawers not more than 3 inches high and not more than 24 inches wide, provide Grade 1.
3. For drawers more than 3 inches high but not more than 6 inches high and not more than 24 inches wide, provide Grade 1.
4. For drawers more than 6 inches high or more than 24 inches wide, provide Grade 1HD-100.
5. For trash bins not more than 20 inches high and 16 inches wide, provide Grade 1HD-100.

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

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

2.8 SHOP FINISHING
A. General: Finish architectural wood cabinets at fabrication shop as specified in this Section. Defer only final touchup, cleaning, and polishing until after installation.
B. Finish Materials: Use finish materials that 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. Preparation for Finishing: Comply with referenced quality standard for sanding, filling countersunk fasteners, sealing concealed surfaces, and similar preparations for finishing architectural wood cabinets, as applicable to each unit of work.
D. Transparent Finish:
   1. Grade: Custom - Same as item to be finished.
   3. Staining: None required
4. Sheen: Semigloss, 46-60 gloss units measured on 60-degree gloss meter per ASTM D 523.

PART 3 - EXECUTION

3.1 PREPARATION
   A. Before installation, condition cabinets to average prevailing humidity conditions in installation areas.
   B. If cabinets come from out of state notify Architect and Owner before purchasing to discuss issues with humidity levels in region where cabinets come from versus local conditions

3.2 INSTALLATION
   A. Grade: Install cabinets to comply with same grade as item to be installed.
   B. Install cabinets level, plumb, true, and straight. Shim as required with concealed shims. Install level and plumb to a tolerance of 1/8 inch in 96 inches.
   C. Scribe and cut cabinets to fit adjoining work, refinish cut surfaces, and repair damaged finish at cuts.
   D. Anchor cabinets to anchors or blocking built in or directly attached to substrates. Secure with countersunk, concealed fasteners and blind nailing. Use fine finishing nails or finishing screws for exposed fastening, countersunk and filled flush with woodwork.
   E. Cabinets: Install without distortion so doors and drawers fit openings properly and are accurately aligned. Adjust hardware to center doors and drawers in openings and to provide unencumbered operation. Complete installation of hardware and accessory items as indicated.
      1. Install cabinets with no more than 1/8 inch in 96-inch sag, bow, or other variation from a straight line.
      2. Fasten wall cabinets through back, near top and bottom, and at ends not more than 16 inches o.c. with [No. 10 wafer-head screws sized for not less than 1-1/2-inch penetration into wood framing, blocking, or hanging strips.
   F. Touch up finishing work specified in this Section after installation of woodwork. Fill nail holes with matching filler where exposed.

END OF SECTION 06 4113
SECTION 07 1113 - BITUMINOUS DAMPPROOFING

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes cold-applied, cut-back and emulsified asphalt dampproofing.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. LEED Submittals:
      1. Product Data for dampproofing, documentation including printed statement of VOC content.
      2. Laboratory Test Reports for dampproofing, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL
   A. VOC Content: Products shall comply with VOC content limits of authorities having jurisdiction unless otherwise required.

2.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING
   A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      1. BASF Construction Chemicals - Construction Systems.
      2. ChemMasters, Inc.
      3. Henry Company.
   B. Trowel Coats: ASTM D 1227, Type II, Class 1.
   C. Fibered Brush and Spray Coats: ASTM D 1227, Type II, Class 1.
   D. Brush and Spray Coats: ASTM D 1227, Type III, Class 1.
   E. VOC Content: 30 g/L or less.
   F. Low-Emitting Materials: Dampproofing 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."
2.3 AUXILIARY MATERIALS

A. General: Furnish auxiliary materials recommended in writing by dampproofing manufacturer for intended use and compatible with bituminous dampproofing.

B. Emulsified-Asphalt Primer: ASTM D 1227, Type III, Class 1, except diluted with water as recommended in writing by manufacturer.
   1. Primer shall comply with the testing and product requirements of the California Department of Health Services’ "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

C. Asphalt-Coated Glass Fabric: ASTM D 1668, Type I.

D. Protection Course: Extruded-polystyrene board insulation, unfaced, ASTM C 578, Type X, 2 inch (50.8 mm) thick.

PART 3 - EXECUTION

3.1 APPLICATION, GENERAL

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

B. Where dampproofing footings and foundation walls, apply from finished-grade line to top of footing; extend over top of footing and down a minimum of 6 inches (150 mm) over outside face of footing.
   1. Extend dampproofing 12 inches (300 mm) onto intersecting walls and footings, but do not extend onto surfaces exposed to view when Project is completed.
   2. Install flashings and corner protection striping at internal and external corners, changes in plane, construction joints, cracks, and where shown as "reinforced," by embedding an 8-inch- (200-mm-) wide strip of asphalt-coated glass fabric in a heavy coat of dampproofing. Dampproofing coat for embedding fabric is in addition to other coats required.

C. Where dampproofing exterior face of inner wythe of exterior masonry cavity walls, lap dampproofing at least 1/4 inch (6 mm) onto flashing, masonry reinforcement, veneer ties, and other items that penetrate inner wythe.
   1. Extend dampproofing over outer face of structural members and concrete slabs that interrupt inner wythe.
   2. Lap dampproofing at least 1/4 inch (6 mm) onto shelf angles supporting veneer.

D. Where dampproofing interior face of above-grade, exterior concrete and masonry walls, continue dampproofing through intersecting walls by keeping vertical mortar joints at intersection temporarily open or by dampproofing wall before constructing intersecting walls.
3.2 COLD-APPLIED, EMULSIFIED-ASPHALT DAMPPROOFING

A. Concrete Foundations and Parged Masonry Foundation Walls: Apply two brush or spray coats at not less than 1.5 gal./100 sq. ft. (0.6 L/sq. m) for first coat and 1 gal./100 sq. ft. (0.4 L/sq. m) for second coat, one fibered brush or spray coat at not less than 3 gal./100 sq. ft. (1.2 L/sq. m), or one trowel coat at not less than 4 gal./100 sq. ft. (1.6 L/sq. m).

B. Unparged Masonry Foundation Walls: Apply primer and two brush or spray coats at not less than 1.5 gal./100 sq. ft. (0.6 L/sq. m) for first coat and 1 gal./100 sq. ft. (0.4 L/sq. m) for second coat, primer and one fibered brush or spray coat at not less than 3 gal./100 sq. ft. (1.2 L/sq. m), or primer and one trowel coat at not less than 5 gal./100 sq. ft. (2 L/sq. m).

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

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

E. Interior Face of Exterior Concrete Walls: Where above grade and indicated to be furred and finished, apply one brush or spray coat at not less than 1 gal./100 sq. ft. (0.4 L/sq. m).

F. Interior Face of Exterior Masonry Walls: Where above grade and indicated to be furred and finished, apply primer and one brush or spray coat at not less than 1 gal./100 sq. ft. (0.4 L/sq. m).

3.3 INSTALLATION OF PROTECTION COURSE

A. Where indicated, install protection course over completed-and-cured dampproofing. Comply with dampproofing-material and protection-course manufacturers’ written instructions for attaching protection course.

END OF SECTION 07 1113
SECTION 07 1810 - WALKABLE ACRYLIC WATERPROOFING

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes a troweled proprietary blend of high performance acrylic formulations that provides a durable walking surface waterproofing system available in a variety of textures, finishes, and colors.
   B. Related Requirements:
      1. Section 07 9200 Joint sealants.

1.2 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Product Data for adhesives and sealants, documentation including printed statement of VOC content.
   C. Product Data for solvent cements and adhesive primers, documentation including printed statement of VOC content.
   D. Product Data for paints and coatings, documentation including printed statement of VOC content and chemical components.
   E. Laboratory Test Reports for adhesives, sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services’ "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
   F. Shop Drawings:
      1. Include plans, elevations, sections, and attachment details.
      2. Include details of equipment assemblies. Indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
   G. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS
   A. Product certificates.
   B. Material test reports.
   C. Product test reports.
   D. Research reports.
E. Field quality-control reports.
F. Sample warranty.

1.5 CLOSEOUT SUBMITTALS
A. Maintenance data.

1.6 QUALITY ASSURANCE
A. Installer Qualifications: Fabricator of products.
B. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.
C. Substrates: a minimum 3/4” [19 mm] sound and dry, exterior grade APA rated sheeting installed in accordance with this specification.
   1. Installer/Contractor shall verify that the proposed substrate is acceptable prior to the application of the system. Contact manufacturer for applications over Oriented Strand Board (OSB).
D. Performance Requirements:
   1. Water Vapor Transmission (ASTM E 96)
   2. Bond Strength (ASTM C 297)
   3. Abrasion Test (ASTM D 968)
   4. Weatherability Test (ASTM G 23)
   5. Class A Burn Tests (ASTM E 108)
   6. Freeze-Thaw Cycling (ASTM A75)
   7. Compressive Strength (ASTM C150-72)
   8. Water Absorption (ASTM D570)
   10. Static Coefficient of Friction (ASTM C 1028-96)
   11. One-Hour System (ASTM E119)
   12. Wind-Up Lift (Factory Mutual 1.52)

1.7 WARRANTY
A. Manufacturer's Warranty: Manufacturer and Installer agree to repair or replace components of pli-deck system that fail(s) in materials or workmanship within specified warranty period.
   1. Warranty Period: ten (10) year(s) from date of Substantial Completion.

PART 2 - PRODUCTS
2.1 MANUFACTURERS
A. Products: Subject to compliance with requirements, provide the following:
B. Manufacturers: Subject to compliance with requirements, provide products by the following:
   1. Pli-Dek Systems, Inc.

2.2 PERFORMANCE REQUIREMENTS
A. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.
   1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: 25 or less.
   2. Smoke-Developed Index: 50 or less.
C. Fire-Resistance Ratings: Comply with ASTM E 119; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

2.3 MATERIALS
A. Water: Shall be clean and potable.
B. Galvanized Metal Lath weighing 1.4 kg/m² (2.5lb. /yd.²): An expanded metal lath. The lath must be dipped not electro-galvanized.
D. Flashing: 26 gauge Bonderized, Galvanized Sheet Metal.
E. S99-1 Sealer: Water-based, clear sealer (optional).

2.4 COMPONENTS
A. GU80-1 Base Coat (gray): A Portland cement and silicon dioxide composition that is to be mixed with GU80-1 Liquid Admixture.
B. GU80-1 Liquid Admixture: An acrylic polymer emulsion.
C. Fiberglass Mat: Chopped strand ¾ oz. woven mat (Not always required)
D. PD Resin Base Coat: A high build elastomeric acrylic resin. (Not always required)
E. GU80-1 Top Coat/Custom Top Coat (white): A Portland cement and silicon dioxide composition to be mixed with GU80-1 Liquid Admixture.
F. GS88-1 Sealer: Pigmented water-based coating.
G. GS99-1 Sealer: Water-based, clear sealer (optional).
2.5 EQUIPMENT
A. Mixing shall be done with a clean Wind-lock B-M1 mixing blade or equivalent powered by a 13-mm (1/2") variable speed drill capable of producing 1000 RPM.
B. Tools: refer to the Pli-Dek Application Instructions, PD-165, for a complete list of recommended tools.

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examination of Substrate:
1. Ensure that the substrate is of sound exterior grade exposure 1 sheathing.
2. Refer to ICC-ES Legacy Report for framing requirements.
3. All surfaces shall be sloped for positive drainage. A slope of 1/4” per linear foot [6.4 mm/.3m] is required.
4. All plywood seams shall be staggered and a 1/8” (3.2 mm) space between all sheets shall exist.
5. Framing or blocking must support all plywood edges, except as per APA guidelines, blocking is not required when tongue and groove plywood is used. Joists to be spaced 16” on center. For alternate assemblies contact Pli-Dek Systems, Inc. for written approval.
6. Maximum deflection of the deck shall not exceed L/360th of the span.
7. Minimum thickness of plywood shall be 3/4” thick; exposure 1 sheeting recommended.
8. All adjacent edges of the plywood sheets shall not be more than 0.78 mm (1/32”) out of plane (i.e.: above or below each other).
B. Flashing:
1. Flashing shall be minimum 26 gauge galvanized, bonderized sheet metal.
2. Proper flashing must be installed at all doors, walls, fascia edges, posts, penetrations, columns, etc. See Pli-Dek Details for further instructions (PD-150 Architectural Details). Contact Pli-Dek for written approval on flashing details that vary or are not included in PD-150 Architectural Details.
3. Flashing must be installed to accommodate all exterior wall coating applications from coming in contact with the deck surface. Exterior siding, stucco, etc. must be held off the deck a minimum of 2” [50 mm].
4. All flashing splices must be overlapped a minimum of 4” [100 mm] and caulked between any two pieces of flashing with a Vulkem 931 Urethane sealant or equivalent. All flashing overlaps shall be installed as to not “buck” water.
5. Flashing at walls must be installed behind the building paper (or equivalent) on all areas that intersect the deck surface.
3.2 PREPARATION
A. Plywood Deck:
1. All seams in plywood shall be gapped 1/8” [3.2 mm], and covered with a maximum of 2” [50 mm] wide Pli-Dek approved flashing paper and tacked in place.
2. Plywood shall be free of dust, moisture and/or other debris or residue that would affect adhesion.
3. Delaminated plywood shall be replaced with sound plywood.
4. Fascia boards shall be installed to be level with the plywood substrate.
5. Perimeter walls should be framed so to be consistent with interior floor boundaries.

3.3 APPLICATION
A. General:
1. Refer to the Pli-Dek Application Instructions, PD-165, for complete information.
B. Basecoat:
1. Mix the GU80-1 Liquid Admixture with GU80-1 Base Coat. Refer to Pli-Dek Application Instructions, PD-165 for complete instructions.
2. Trowel Base Coat emulsion into the galvanized expanded metal lath completely covering the metal lath. Allow it to dry completely, for approximately two (2) to six (6) hours, depending on weather conditions. Refer to the Pli-Dek Application Instructions, PD-165, for complete information.
C. Pli-Dek “F” System (Fiberglass and Resin Coat):
1. Lay out the .75 oz fiberglass mat over entire deck and apply two coats of PD Resin Base Coat.
D. Pli-Dek Finish Options / Specification Reference: (See Pli-Dek Application Instructions, PD165)
1. “Knock Down” texture.

3.4 FIELD QUALITY CONTROL
A. The installer shall be responsible for the proper application of the Pli-Dek materials.
B. Manufacturer shall not be responsible for on-site inspections, application or workmanship.

3.5 CLEAN-UP
A. All excess Pli-Dek materials shall be removed from the job site by the contractor in accordance with contract provisions.
B. All surrounding areas, where the Pli-Dek materials have been applied, shall be left free of debris and foreign substances resulting from the contractor’s work.

END OF SECTION 07 1810

WALKABLE WATERPROOF COATING FOR PLYWOOD – 07 1810 PLATINUM APARTMENTS – 13012
SECTION 07 2100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Extruded polystyrene foam-plastic board.
      2. Glass-fiber insulation.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.
      1. Laboratory Test Reports for glass-fiber insulation products, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health’s (formerly, the California Department of Health Services’) “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.”
   B. Low-emitting product certification.

1.3 INFORMATIONAL SUBMITTALS
   A. Product test reports.
   B. Research reports.

PART 2 - PRODUCTS

2.1 EXTRUDED POLYSTYRENE FOAM-PLASTIC BOARD
   A. Extruded polystyrene boards in this article are also called “XPS boards.”
   B. Extruded Polystyrene Board, Type X: ASTM C 578, Type X, 15-psi (104-kPa) minimum compressive strength; unfaced; maximum flame-spread and smoke-developed indexes of 25 and 450, respectively, per ASTM E 84.
      1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
         a. Dow Chemical Company (The).
         b. Owens Corning.
2.2 GLASS-FIBER INSULATION

A. Sustainability Requirements: Provide glass-fiber insulation as follows:
   1. Free of Formaldehyde: Insulation manufactured with 100 percent acrylic binders and
      no formaldehyde.

B. Blown-in loose-fill glass fiber insulation: ASTM C 764, Type I; with maximum flame-spread
   and smoke-developed indexes of 25 and 50, respectively, per ASTM E 84; passing
   ASTM E 136 for combustion characteristics.

   1. Manufacturers: Subject to compliance with requirements, provide products by one of
      the following:

      a. CertainTeed Corporation.
      b. Guardian Building Products, Inc.
      c. Johns Manville; a Berkshire Hathaway company.
      d. Owens Corning.

C. Non-woven fabric or an equivalent having the following properties:
   1. Frazier air permeability = 420 cfm ft2 at 0.5” H2O; Coulter average maximum pore
      size: 200 micrometers; Grab tensile strength, lb./inch, average: MD: 22, CD: 22

2.3 MINERAL-WOOL BLANKETS

A. Mineral-Wool Sound Attenuation Blanket, Unfaced: ASTM C 665, Type I (blankets without
   membrane facing); consisting of fibers; with maximum flame-spread and smoke-developed
   indexes of 25 and 50, respectively, per ASTM E 84; passing ASTM E 136 for combustion
   characteristics.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers
      offering products that may be incorporated into the Work include, but are not limited
      to the following:

      a. Roxul Inc.
      b. Thermafiber, Inc.; an Owens Corning company.

2.4 ACCESSORIES

A. Insulation for Miscellaneous Voids:
   1. Glass-Fiber Insulation: ASTM C 764, Type II, loose fill; with maximum flame-spread
      and smoke-developed indexes of 5, per ASTM E 84.
   2. Spray Polyurethane Foam Insulation: ASTM C 1029, Type II, closed cell, with
      maximum flame-spread and smoke-developed indexes of 75 and 450, respectively,
      per ASTM E 84.

B. Insulation Anchors, Nets, Spindles, and Standoffs: As recommended by manufacturer.
PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL
A. Comply with insulation manufacturer's written instructions applicable to products and applications.
B. Install insulation that is undamaged, dry, and unsoiled and that has not been left exposed to ice, rain, or snow at any time.
C. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.
D. Provide sizes to fit applications and selected from manufacturer's standard thicknesses, widths, and lengths. Apply single layer of insulation units unless multiple layers are otherwise shown or required to make up total thickness or to achieve R-value.
E. Seal all penetrations in common walls with expanding foam.

3.2 INSTALLATION OF SLAB INSULATION
A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive according to manufacturer's written instructions.
   1. If not otherwise indicated, extend insulation a minimum of 24 inches (610 mm) below exterior grade line.
B. On horizontal surfaces, loosely lay insulation units according to manufacturer's written instructions. Stagger end joints and tightly abut insulation units. Tape all seams with manufacturer’s recommended joint tape.

3.3 INSTALLATION OF FOUNDATION WALL INSULATION
A. Butt panels together for tight fit.
B. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing according to manufacturer's written instructions.

3.4 INSTALLATION OF CAVITY-WALL INSULATION
A. Foam-Plastic Board Insulation: Install adhesive as recommended by manufacturer. Fit courses of insulation between wall ties and other obstructions, with edges butted tightly in both directions. Press units firmly against inside substrates.
B. Coordinate insulation installation requirements with exterior finish system requirements.

3.5 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION
A. Blown-in Glass Fiber Insulation: Install in cavities formed by framing members according to the following requirements:
   1. Fabric installation:
      a. Select proper fabric size for the construction type (8-foot, 9-foot or 10-foot walls).
b. Cut a section of fabric from the roll that extends approximately 1 foot beyond each side of the wall to be covered.

c. Staple tack the corners on one side (top and bottom), making sure the fabric is stretched taut.

d. Staple tack the opposite corners, pulling the fabric tightly to prevent any sagging. On long wall sections staple tack along the top plate periodically while stretching the fabric until the opposite corners are reached.

e. Staple every 1 to 1-1/2 inches starting from oneside along each stud face. Using a free hand, press on the fabric covering the next cavity space while stapling the fabric on the next stud face. Staple along the top and bottom plates while progressing.

f. Verify that the fabric is evenly stretched over the entire wall section.

g. Cut away fabric that is covering any openings (i.e., doors or windows) that require access before the installation is completed. Also, trim away any excess fabric.

2. Glass Fiber Installation:

   a. Make a small (approximately 4-inch) vertical incision in the fabric at waist height. On an 8-foot cavity, one hole may suffice; however, on a 9-foot or greater cavity, cut a second hole.

   b. Insert the hose or nozzle into the hole and down the cavity to approximately 18 inches from the bottom or below wiring and fill from the bottom up, working the hose side to side as you go and slowly pulling the hose back as the cavity fills in 10 – 12 increments. For cavities with two holes begin with the lower hole.

   c. Upon reaching the access hole, turn the hose or nozzle 180 degrees and push it up to approximately 18” from the top of the cavity. Fill from the top down while continuing to move the hose or nozzle.

   d. Proper density is critical in achieving optimum R-Value. An average blowing rate of 15 pounds per minute should be targeted. Perform density check per manufacturer’s recommendations.

   e. Properly installed fabric and product will have a slight bulge (3/8”); do not smooth, insulation should make contact with drywall for optimum R-Value.

B. Miscellaneous Voids: Install insulation in miscellaneous voids and cavity spaces where required to prevent gaps in insulation using the following materials:

   1. Glass-Fiber Insulation: Compact to approximately 40 percent of normal maximum volume equaling a density of approximately 2.5 lb/cu. ft. (40 kg/cu. m).

END OF SECTION 07 2100
SECTION 07 2500 - WEATHER BARRIERS

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Building paper.
      2. Building wrap.
      3. Flexible flashing.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS
   A. Evaluation Reports: For water-resistive barrier and flexible flashing, from ICC-ES.

PART 2 - PRODUCTS

2.1 WATER-RESISTIVE BARRIER
   A. Building Paper: ASTM D 226, Type 1 (No. 15 asphalt-saturated organic felt), unperforated.
   B. Building Paper: Water-vapor-permeable, asphalt-saturated kraft building paper that complies with ICC-ES AC38, Grade D; except with water-resistance rating not less than 1 hour.

2.2 MISCELLANEOUS MATERIALS
   A. Butyl Rubber, Flexible Flashing: Self-adhesive rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).
      1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
         a. Protecto Wrap Company.
   B. Rubberized-Asphalt, Flexible Flashing: Self-adhesive rubberized-asphalt compound, bonded to a high-density polyethylene film, aluminum foil, or spunbonded polyolefin to produce an overall thickness of not less than 0.025 inch (0.6 mm).
1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

   a. [Carlisle Coatings & Waterproofing Inc.](#)
   b. [Fortifiber Building Systems Group.](#)
   c. [Grace Construction Products; W.R. Grace & Co. -- Conn.](#)

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**PART 3 - EXECUTION**

### 3.1 WATER-RESISTIVE BARRIER INSTALLATION

A. Cover sheathing with water-resistant barrier as follows:

   1. Cut back barrier 1/2 inch (13 mm) on each side of the break in supporting members at expansion- or control-joint locations.
   2. Apply barrier to cover vertical flashing with a minimum 4-inch (100-mm) overlap unless otherwise indicated.

B. Building Paper: Apply horizontally with a 2-inch (50-mm) overlap and a 6-inch (150-mm) end lap; fasten to sheathing with galvanized staples or roofing nails.

C. Building Wrap: Comply with manufacturer's written instructions.

   1. Seal seams, edges, fasteners, and penetrations with tape.
   2. Extend into jambs of openings and seal corners with tape.

### 3.2 FLEXIBLE FLASHING INSTALLATION

A. Apply flexible flashing where indicated to comply with manufacturer's written instructions.

   1. Lap seams and junctures with other materials at least 4 inches (100 mm) except that at flashing flanges of other construction, laps need not exceed flange width.
   2. Lap flashing over water-resistant barrier at bottom and sides of openings.
   3. Lap water-resistant barrier over flashing at heads of openings.

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END OF SECTION 07 2500
SECTION 07 4646 - FIBER-CEMENT SIDING

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes fiber-cement siding and soffit.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Samples: For fiber-cement siding and soffit including related accessories.

1.3 INFORMATIONAL SUBMITTALS
   A. Product certificates.
   B. Product test reports.
   C. Research/evaluation reports.
   D. Sample warranty.

1.4 CLOSEOUT SUBMITTALS
   A. Maintenance data.

1.5 QUALITY ASSURANCE
   A. Mockups: Build mockups to verify selections made under Sample submittals and to
demonstrate aesthetic effects and to set quality standards for fabrication and installation.
   1. Build mockup of typical wall area as shown on Drawings.

1.6 WARRANTY
   A. Special Warranty: Manufacturer agrees to repair or replace products that fail in materials or
   workmanship within specified warranty period.
   1. Warranty Period: 15 year (for finish) 30 year (for material) years from date of
   Substantial Completion.

PART 2 - PRODUCTS

2.1 FIBER-CEMENT SIDING
   A. General: ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested
   according to ASTM E 136; with a flame-spread index of 25 or less when tested according to
   ASTM E 84.
1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. **CertainTeed Corporation.**
   b. **James Hardie Building Products, Inc.**
   c. **Nichiha Fiber Cement.**

B. **Labeling:** Provide fiber-cement siding that is tested and labeled according to ASTM C 1186 by a qualified testing agency acceptable to authorities having jurisdiction.

C. **Nominal Thickness:** Not less than 5/16 inch (8 mm).

D. **Panel:** 48-inch- (1200-mm-) wide x 96-inch (2400mm) sheets with smooth texture.

E. **Factory Priming:** Manufacturer's standard acrylic primer.

2.2 **FIBER-CEMENT SOFFIT**

A. **General:** ASTM C 1186, Type A, Grade II, fiber-cement board, noncombustible when tested according to ASTM E 136; with a flame-spread index of 25 or less when tested according to ASTM E 84.

1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. **CertainTeed Corporation.**
   b. **James Hardie Building Products, Inc.**
   c. **Nichiha Fiber Cement.**

B. **Nominal Thickness:** Not less than 5/16 inch (8 mm).

C. **Panel:** 48-inch- (1200-mm-) wide x 96-inch (2400mm) sheets with smooth texture.

D. **Factory Priming:** Manufacturer's standard acrylic primer.

2.3 **ACCESSORIES**

A. **Siding Accessories, General:** Provide starter strips, edge trim, outside and inside corner caps, and other items as recommended by siding manufacturer for building configuration.

B. **Flashing:** Provide aluminum or stainless-steel flashing complying with Section 07 6200 "Sheet Metal Flashing and Trim" at window and door heads and where indicated.

C. **Fasteners:**
   1. For fastening to wood, use pan-head screws of sufficient length to penetrate a minimum of 1 inch (25 mm) into wood substrate.
   2. For fastening fiber cement, use hot-dip galvanized or stainless-steel fasteners.

D. **Insect Screening:** Aluminum, 18-by-16 (1.4-by-1.6-mm) mesh.
PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Comply with manufacturer’s written installation instructions applicable to products and applications indicated unless more stringent requirements apply.

1. Install fasteners and fastner spacing per manufacturer recommendations – verify with Architect prior to installation.

B. Install joint sealants as specified in Section 07 9200 "Joint Sealants" and to produce a weathertight installation.

3.2 ADJUSTING AND CLEANING

A. Remove damaged, improperly installed, or otherwise defective materials and replace with new materials complying with specified requirements.

B. Clean finished surfaces according to manufacturer’s written instructions and maintain in a clean condition during construction.

END OF SECTION 07 4646
SECTION 07 5423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Mechanically fastened thermoplastic polyolefin (TPO) roofing system.

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

1.3 PREINSTALLATION MEETINGS
   A. Preinstallation Roofing Conference: Conduct conference at Project Site.

1.4 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. LEED Submittals:
      1. Product Data for roof materials, documentation indicating that roof materials comply
         with Solar Reflectance Index requirement and EnergyStar.
      2. Product Data for adhesives and sealants used inside the weatherproofing system,
         documentation including printed statement of VOC content.
      3. Laboratory Test Reports for adhesives and sealants used inside the weatherproofing
         system, documentation indicating that products comply with the testing and product
         requirements of the California Department of Public Health's (formerly, the California
         Department of Health Services') "Standard Method for the Testing and Evaluation of
         Volatile Organic Chemical Emissions from Indoor Sources Using Environmental
         Chambers."
   C. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and
      attachments to other work.
   D. Samples for Verification: For the following products:
      1. Sheet roofing, of color required.
      2. Walkway pads or rolls, of color required.

1.5 INFORMATIONAL SUBMITTALS
   A. Research/Evaluation Reports: For components of roofing system, from ICC-ES.
   B. Sample Warranties: For manufacturer's special warranties.
1.6 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For roofing system to include in maintenance manuals.

1.7 QUALITY ASSURANCE
   A. Installer Qualifications: A qualified firm that is approved, authorized, or licensed by roofing system manufacturer to install manufacturer's product and that is eligible to receive manufacturer's special warranty.

1.8 WARRANTY
   A. Special Warranty: Manufacturer agrees to repair or replace components of roofing system that fail in materials or workmanship within specified warranty period.
      1. Warranty Period: fifteen (15) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. **Manufacturers**: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      1. Firestone Building Products.
      2. GAF Materials Corporation.
      3. Johns Manville; a Berkshire Hathaway company.
   B. Source Limitations: Obtain components including fasteners, boots, and accessories for roofing system from same manufacturer as membrane roofing or manufacturer approved by membrane roofing manufacturer.

2.2 PERFORMANCE REQUIREMENTS
   A. Accelerated Weathering: Roofing system shall withstand 2000 hours of exposure when tested according to ASTM G 152, ASTM G 154, or ASTM G 155.
   B. Impact Resistance: Roofing system shall resist impact damage when tested according to ASTM D 3746 or ASTM D 4272.
   C. Roofing System Design: Tested by a qualified testing agency to resist the following uplift pressures:
      1. Corner Uplift Pressure: 38.5 lbf/sq. ft. (kPa/sq. m).
      2. Perimeter Uplift Pressure: 38.5 lbf/sq. ft. (kPa/sq. m).
      3. Field-of-Roof Uplift Pressure: 22.9 lbf/sq. ft. (kPa/sq. m).
   D. Solar Reflectance Index: Not less than 78 when calculated according to ASTM E 1980, based on testing identical products by a qualified testing agency.
E. Energy Star Listing: Roofing system shall be listed on the DOE's ENERGY STAR "Roof Products Qualified Product List" for low-slope roof products.

F. Exterior Fire-Test Exposure: ASTM E 108 or UL 790, Class A; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

G. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 TPO ROOFING

   1. Thickness: 60 mils (1.5 mm), nominal.
   2. Exposed Face Color: White.

2.4 AUXILIARY ROOFING MATERIALS

A. General: Auxiliary materials recommended by roofing system manufacturer for intended use and compatible with roofing.

   1. Liquid-type auxiliary materials shall comply with VOC limits of authorities having jurisdiction.

   2. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the following limits for VOC content:
      a. Plastic Foam Adhesives: 50 g/L.
      b. Gypsum Board and Panel Adhesives: 50 g/L.
      c. Multipurpose Construction Adhesives: 70 g/L.
      d. Fiberglass Adhesives: 80 g/L.
      e. Single-Ply Roof Membrane Adhesives: 250 g/L.
      f. Single-Ply Roof Membrane Sealants: 450 g/L.
      g. Nonmembrane Roof Sealants: 300 g/L.
      h. Sealant Primers for Nonporous Substrates: 250 g/L.
      i. Sealant Primers for Porous Substrates: 775 g/L.
      j. Other Adhesives and Sealants: 250 g/L.

   3. Adhesives and sealants that are not on the exterior side of weather barrier shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

B. Sheet Flashing: Manufacturer's standard unreinforced TPO sheet flashing, 55 mils (1.4 mm) thick, minimum, of same color as TPO sheet.
C. Bonding Adhesive: Manufacturer's standard, **water based**.
D. Slip Sheet: Manufacturer's standard, of thickness required for application.
E. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roofing to substrate, and acceptable to roofing system manufacturer.
F. Miscellaneous Accessories: Provide metal termination bars, metal battens, pourable sealers, preformed cone and vent sheet flashings, preformed inside and outside corner sheet flashings, T-joint covers, lap sealants, termination reglets, and other accessories.

### 2.5 SUBSTRATE BOARDS
A. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/4 inch (6 mm) thick.
B. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening substrate board to roof deck.

### 2.6 INSULATION ACCESSORIES
A. Fasteners: Factory-coated steel fasteners and metal or plastic plates complying with corrosion-resistance provisions in FM Global 4470, designed for fastening roof insulation and cover boards to substrate, and acceptable to roofing system manufacturer.
B. Insulation Adhesive: Insulation manufacturer's recommended adhesive formulated to attach roof insulation to substrate or to another insulation layer.

### 2.7 WALKWAYS
A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway rolls, approximately 3/16 inch (5 mm) thick and acceptable to roofing system manufacturer.
   1. Ultra-ply Walkway TPO Walkway Pad by Firestone Building Products.

## PART 3 - EXECUTION

### 3.1 ROOFING INSTALLATION, GENERAL
A. Install roofing system according to roofing system manufacturer's written instructions.
B. Complete terminations and base flashings and provide temporary seals to prevent water from entering completed sections of roofing system at the end of the workday or when rain is forecast. Remove and discard temporary seals before beginning work on adjoining roofing.
C. Install roofing and auxiliary materials to tie in to existing roofing to maintain weathertightness of transition.
3.2 SUBSTRATE BOARD INSTALLATION
   A. Install substrate board with long joints in continuous straight lines, perpendicular to roof slopes with end joints staggered between rows. Tightly butt substrate boards together.
      1. Fasten substrate board to plywood deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3.3 MECHANICALLY FASTENED ROOFING INSTALLATION
   A. Mechanically fasten roofing over area to receive roofing according to roofing system manufacturer's written instructions. Unroll roofing and allow to relax before retaining.
   B. Accurately align roofing, and maintain uniform side and end laps of minimum dimensions required by manufacturer. Stagger end laps.
   C. Mechanically fasten or adhere roofing securely at terminations, penetrations, and perimeter of roofing.
   D. Apply roofing with side laps shingled with slope of roof deck where possible.
   E. In-Seam Attachment: Secure one edge of TPO sheet using fastening plates or metal battens centered within seam, and mechanically fasten TPO sheet to roof deck.
   F. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions to ensure a watertight seam installation.
      1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
      2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
      3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.
   G. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

3.4 BASE FLASHING INSTALLATION
   A. Install sheet flashings and preformed flashing accessories, and adhere to substrates according to roofing system manufacturer's written instructions.
   B. Apply bonding adhesive to substrate and underside of sheet flashing at required rate, and allow to partially dry. Do not apply to seam area of flashing.
   C. Flash penetrations and field-formed inside and outside corners with cured or uncured sheet flashing.
   D. Clean seam areas, overlap, and firmly roll sheet flashings into the adhesive. Hot-air weld side and end laps to ensure a watertight seam installation.
   E. Terminate and seal top of sheet flashings and mechanically anchor to substrate through termination bars.
3.5 WALKWAY INSTALLATION
   A. Flexible Walkways: Install walkway products in locations indicated. Heat weld to substrate or adhere walkway products to substrate with compatible adhesive according to roofing system manufacturer's written instructions.

3.6 PROTECTING AND CLEANING
   A. Protect roofing system from damage and wear during remainder of construction period. When remaining construction does not affect or endanger roofing, inspect roofing for deterioration and damage, describing its nature and extent in a written report, with copies to Architect and Owner.
   B. Correct deficiencies in or remove roofing system that does not comply with requirements, repair substrates, and repair or reinstall roofing system to a condition free of damage and deterioration at time of Substantial Completion and according to warranty requirements.
   C. Clean overspray and spillage from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction.

END OF SECTION 07 5423
PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Manufactured reglets with counterflushing.
      2. Formed roof-drainage sheet metal fabrications.
      4. Formed wall sheet metal fabrications.

1.2 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Shop Drawings: For sheet metal flashing and trim.
      1. Include plans, elevations, sections, and attachment details.
      2. Distinguish between shop- and field-assembled work.
      3. Include identification of finish for each item.
      4. Include pattern of seams and details of termination points, expansion joints and expansion-joint covers, direction of expansion, roof-penetration flashing, and connections to adjoining work.
   C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS
   A. Product certificates.
   B. Product test reports.
   C. Sample warranty.

1.5 CLOSEOUT SUBMITTALS
   A. Maintenance data.

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

B. Mockups: Build mockups to verify selections made under Sample submittals to demonstrate aesthetic effects and to set quality standards for fabrication and installation.

1. Build mockup of typical roof edge and eave, including built-in gutter, fascia and fascia trim, apron flashing, approximately 10 feet (3.0 m) long.

1.7 WARRANTY

A. Special Warranty on Finishes: Manufacturer agrees to repair finish or replace sheet metal flashing and trim that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Finish Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General: Sheet metal flashing and trim assemblies shall withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failure due to defective manufacture, fabrication, installation, or other defects in construction. Completed sheet metal flashing and trim shall not rattle, leak, or loosen, and shall remain watertight.

B. SPRI Wind Design Standard: Manufacture and install roof edge flashings tested according to SPRI ES-1 and capable of resisting the following design pressure:

1. Design Pressure: As indicated on Drawings.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes.

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

2.2 SHEET METALS

A. General: Protect mechanical and other finishes on exposed surfaces from damage by applying strippable, temporary protective film before shipping.

B. Metallic-Coated Steel Sheet: Provide zinc-coated (galvanized) steel sheet according to ASTM A 653/A 653M, G90 (Z275) coating designation or aluminum-zinc alloy-coated steel sheet according to ASTM A 792/A 792M, Class AZ50 (Class AZM150) coating designation, Grade 40 (Grade 275); prepainted by coil-coating process to comply with ASTM A 755/A 755M.

1. Exposed Coil-Coated Finish:
   a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and
apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

b. Siliconized Polyester: Epoxy primer and silicone-modified, polyester-enamel topcoat; with dry film thickness of not less than 0.2 mil (0.005 mm) for primer and 0.8 mil (0.02 mm) for topcoat.

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

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

B. Synthetic Underlayment: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; bitumen free; slip resistant; suitable for high temperatures over 220 deg F (111 deg C); and complying with physical requirements of ASTM D 226/D 226M for Type I and Type II felts.

C. Self-Adhering, High-Temperature Sheet: Minimum 30 mils (0.76 mm) thick, consisting of a slip-resistant polyethylene- or polypropylene-film top surface laminated to a layer of butyl- or SBS-modified asphalt adhesive, with release-paper backing; specifically designed to withstand high metal temperatures beneath metal roofing. Provide primer according to written recommendations of underlayment manufacturer.

1. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.

2. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C) or lower.

D. Slip Sheet: Rosin-sized building paper, 3 lb/100 sq. ft. (0.16 kg/sq. m) minimum.

2.4 MISCELLANEOUS MATERIALS

A. General: Provide materials and types of fasteners, solder, protective coatings, sealants, and other miscellaneous items as required for complete sheet metal flashing and trim installation and as recommended by manufacturer of primary sheet metal or manufactured item unless otherwise indicated.

B. Fasteners: Wood screws, annular threaded nails, self-tapping screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads and recommended by manufacturer of primary sheet metal or manufactured item.

1. General: Blind fasteners or self-drilling screws, gasketed, with hex-washer head.

   a. Exposed Fasteners: Heads matching color of sheet metal using plastic caps or factory-applied coating. Provide metal-backed EPDM or PVC sealing washers under heads of exposed fasteners bearing on weather side of metal.

   b. Blind Fasteners: High-strength aluminum or stainless-steel rivets suitable for metal being fastened.

   c. Spikes and Ferrules: Same material as gutter; with spike with ferrule matching internal gutter width.
2. Fasteners for Zinc-Coated (Galvanized), Aluminum-Zinc Alloy-Coated Steel Sheet: hot-dip galvanized steel according to ASTM A 153/A 153M or ASTM F 2329.

C. Solder:
1. For Zinc-Coated (Galvanized) Steel: ASTM B 32, with maximum lead content of 0.2 percent.

D. Sealant Tape: Pressure-sensitive, 100 percent solids, polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape 1/2 inch (13 mm) wide and 1/8 inch (3 mm) thick.

E. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane or silicone polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

F. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

G. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

H. Bituminous Coating: Cold-applied asphalt emulsion according to ASTM D 1187.


2.5 MANUFACTURED REGLETS

A. Reglets: Units of type, material, and profile required, formed to provide secure interlocking of separate reglet and counterflashing pieces, and compatible with flashing indicated with factory-mitered and -welded corners and junctions and with interlocking counterflashing on exterior face, of same metal as reglet.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. Cheney Flashing Company.
b. Fry Reglet Corporation.
d. National Sheet Metal Systems, Inc.

2. Subject to compliance with requirements, provide products by one of the following:

a. Cheney Flashing Company.
b. Fry Reglet Corporation.
d. National Sheet Metal Systems, Inc.

3. Material: Galvanized steel, 0.022 inch (0.56 mm) thick.


2.6 FABRICATION, GENERAL

A. General: Custom fabricate sheet metal flashing and trim to comply with details shown and recommendations in cited sheet metal standard that apply to design, dimensions, geometry,
metal thickness, and other characteristics of item required. Fabricate sheet metal flashing and trim in shop to greatest extent possible.

1. Obtain field measurements for accurate fit before shop fabrication.

2. Form sheet metal flashing and trim to fit substrates without excessive oil canning, buckling, and tool marks; true to line, levels, and slopes; and with exposed edges folded back to form hems.

3. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Expansion Provisions: Form metal for thermal expansion of exposed flashing and trim.

1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with butyl sealant concealed within joints.

2. Use lapped expansion joints only where indicated on Drawings.

C. Sealant Joints: Where movable, nonexpansion-type joints are required, form metal to provide for proper installation of elastomeric sealant according to cited sheet metal standard.

D. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

E. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard for application, but not less than thickness of metal being secured.

F. Seams: Fabricate nonmoving seams with flat-lock seams. Tin edges to be seamed, form seams, and solder.

G. Seams: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with elastomeric sealant unless otherwise recommended by sealant manufacturer for intended use. Rivet joints where necessary for strength.

2.7 ROOF-DRAINAGE SHEET METAL FABRICATIONS

A. Hanging Gutters: Fabricate to cross section required, complete with end pieces, outlet tubes, and other accessories as required. Fabricate in minimum 96-inch- (2400-mm-) long sections. Furnish flat-stock gutter brackets and gutter spacers and straps fabricated from same metal as gutters, of size recommended by cited sheet metal standard but with thickness not less than twice the gutter thickness. Fabricate expansion joints, expansion-joint covers, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.

1. Accessories: Continuous, removable leaf screen with sheet metal frame and hardware cloth screen.

B. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors. Shop fabricate elbows.

1. Fabricate from the following materials:

   a. Galvanized Steel: [0.022 inch (0.56 mm)] thick.
C. Parapet Scuppers: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base extending 4 inches (100 mm) beyond cant or tapered strip into field of roof. Fabricate from the following materials:
   1. Galvanized Steel: 0.028 inch (0.71 mm) thick.

D. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape required, complete with outlet tubes. Fabricate from the following materials:
   1. Galvanized Steel: 0.028 inch (0.71 mm) thick.

2.8 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. Roof Edge Flashing (Gravel Stop) and Fascia Cap: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long sections. Furnish with 6-inch- (150-mm-) wide, joint cover plates. Shop fabricate interior and exterior corners.
   1. Fabricate from the Following Materials:
      a. Galvanized Steel: 0.028 inch (0.71 mm) thick.

B. Copings: Fabricate in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections. Fabricate joint plates of same thickness as copings. Furnish with continuous cleats to support edge of external leg and interior leg. Miter corners, fasten and solder or weld watertight. Shop fabricate interior and exterior corners.
   1. Fabricate from the Following Materials:
      a. Galvanized Steel: 0.040 inch (1.02 mm) thick.

C. Base Flashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
   1. Galvanized Steel: 0.028 inch (0.71 mm) thick.

D. Counterflashing and Flashing Receivers: Fabricate from the following materials:
   1. Galvanized Steel: 0.022 inch (0.56 mm) thick.

E. Roof-Penetration Flashing: Fabricate from the following materials:
   1. Galvanized Steel: 0.028 inch (0.71 mm) thick.

2.9 WALL SHEET METAL FABRICATIONS

A. Through-Wall Flashing: Fabricate continuous flashings in minimum 96-inch- (2400-mm-) long, but not exceeding 12-foot- (3.6-m-) long, sections, under copings, and at shelf angles. Fabricate discontinuous lintel, sill, and similar flashings to extend 6 inches (150 mm) beyond each side of wall openings; and form with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
   1. Galvanized Steel: 0.028 inch (0.71 mm) thick.

B. Opening Flashings in Frame Construction: Fabricate head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings. Form head and sill flashing with 2-inch- (50-mm-) high, end dams. Fabricate from the following materials:
1. Galvanized Steel: \textbf{0.028 inch (0.71 mm)} thick.

**PART 3 - EXECUTION**

3.1 **UNDERLAYMENT INSTALLATION**

A. Felt Underlayment: Install felt underlayment, wrinkle free, using adhesive to minimize use of mechanical fasteners under sheet metal flashing and trim. Apply in shingle fashion to shed water, with lapped joints of not less than \textbf{2 inches (50 mm)}.

B. Synthetic Underlayment: Install synthetic underlayment, wrinkle free, according to manufacturers' written instructions, and using adhesive where possible to minimize use of mechanical fasteners under sheet metal.

C. Self-Adhering Sheet Underlayment: Install self-adhering sheet underlayment, wrinkle free. Prime substrate if recommended by underlayment manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation; use primer for installing underlayment at low temperatures. Apply in shingle fashion to shed water, with end laps of not less than \textbf{6 inches (150 mm)} staggered \textbf{24 inches (600 mm)} between courses. Overlap side edges not less than \textbf{3-1/2 inches (90 mm)}. Roll laps and edges with roller. Cover underlayment within \textbf{14 days}.

3.2 **INSTALLATION, GENERAL**

A. General: Anchor sheet metal flashing and trim and other components of the Work securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, sealants, and other miscellaneous items as required to complete sheet metal flashing and trim system.

1. Install sheet metal flashing and trim true to line, levels, and slopes. Provide uniform, neat seams with minimum exposure of solder, welds, and sealant.

2. Install sheet metal flashing and trim to fit substrates and to result in watertight performance. Verify shapes and dimensions of surfaces to be covered before fabricating sheet metal.

3. Space cleats not more than \textbf{12 inches (300 mm)} apart. Attach each cleat with at least two fasteners. Bend tabs over fasteners.

4. Install exposed sheet metal flashing and trim with limited oil canning, and free of buckling and tool marks.

5. Torch cutting of sheet metal flashing and trim is not permitted.

B. Metal Protection: Where dissimilar metals contact each other, or where metal contacts pressure-treated wood or other corrosive substrates, protect against galvanic action or corrosion by painting contact surfaces with bituminous coating or by other permanent separation as recommended by sheet metal manufacturer or cited sheet metal standard.

1. Underlayment: Where installing sheet metal flashing and trim directly on cementitious or wood substrates, install underlayment and cover with slip sheet.
C. Expansion Provisions: Provide for thermal expansion of exposed flashing and trim. Space movement joints at maximum of 10 feet (3 m) with no joints within 24 inches (600 mm) of corner or intersection.
   1. Form expansion joints of intermeshing hooked flanges, not less than 1 inch (25 mm) deep, filled with sealant concealed within joints.
   2. Use lapped expansion joints only where indicated on Drawings.

D. Fasteners: Use fastener sizes that penetrate wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws - verify attachment in substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Conceal fasteners and expansion provisions where possible in exposed work and locate to minimize possibility of leakage. Cover and seal fasteners and anchors as required for a tight installation.

F. Seal joints as required for watertight construction. Prepare joints and apply sealants to comply with requirements in Section 07 9200 "Joint Sealants."

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets with solder to width of 1-1/2 inches (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work.
   1. Do not solder metallic-coated steel sheet.
   2. Do not use torches for soldering.
   3. Heat surfaces to receive solder, and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.3 ROOF-DRAINAGE SYSTEM INSTALLATION

A. General: Install sheet metal roof-drainage items to produce complete roof-drainage system according to cited sheet metal standard unless otherwise indicated. Coordinate installation of roof perimeter flashing with installation of roof-drainage system.

B. Hanging Gutters: Join sections with riveted and soldered joints or joints sealed with sealant. Provide for thermal expansion. Attach gutters at eave or fascia to firmly anchor them in position. Provide end closures and seal watertight with sealant. Slope to downspouts.
   1. Install gutter with expansion joints at locations indicated, but not exceeding, 50 feet (15.24 m) apart. Install expansion-joint caps.
   2. Install continuous gutter screens on gutters with noncorrosive fasteners, removable or hinged to swing open for cleaning gutters.

C. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls. Locate hangers at top and bottom and at approximately 60 inches (1500 mm) o.c.

D. Splash Pans: Install where downspouts discharge on low-slope roofs. Set in asphalt roofing cement or elastomeric sealant compatible with the substrate.

E. Parapet Scuppers: Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
F. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch (25 mm) below scupper or gutter discharge.

G. Expansion-Joint Covers: Install expansion-joint covers at locations and of configuration indicated. Lap joints minimum of 4 inches (100 mm) in direction of water flow.

3.4 ROOF FLASHING INSTALLATION

A. General: Install sheet metal flashing and trim to comply with performance requirements, sheet metal manufacturer’s written installation instructions, and cited sheet metal standard. Provide concealed fasteners where possible, and set units true to line, levels, and slopes. Install work with laps, joints, and seams that are permanently watertight and weather resistant.

B. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated. Interlock bottom edge of roof edge flashing with continuous cleat anchored to substrate.

C. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.

D. Pipe or Post Counterflashing: Install counterflashing umbrella with close-fitting collar with top edge flared for elastomeric sealant, extending minimum of 4 inches (100 mm) over base flashing. Install stainless-steel draw band and tighten.

E. Counterflashing: Coordinate installation of counterflashing with installation of base flashing. Insert counterflashing in reglets or receivers and fit tightly to base flashing. Extend counterflashing 4 inches (100 mm) over base flashing. Lap counterflashing joints minimum of 4 inches (100 mm).

F. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with elastomeric or butyl sealant and clamp flashing to pipes that penetrate roof.

3.5 WALL FLASHING INSTALLATION

A. General: Install sheet metal wall flashing to intercept and exclude penetrating moisture according to cited sheet metal standard unless otherwise indicated. Coordinate installation of wall flashing with installation of wall-opening components such as windows, doors, and louvers.

B. Opening Flashings in Frame Construction: Install continuous head, sill, jamb, and similar flashings to extend 4 inches (100 mm) beyond wall openings.

3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder.

C. Clean off excess sealants.

D. Remove temporary protective coverings and strippable films as sheet metal flashing and trim are installed unless otherwise indicated in manufacturer’s written installation instructions.
END OF SECTION 07 6200
SECTION 07 7100 - ROOF SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Roof-edge specialties.
      2. Roof-edge drainage systems.
      3. Reglets and counterflashings.
   B. Preinstallation Conference: Conduct conference at Project Site.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Shop Drawings: For roof specialties.
      1. Include plans, elevations, expansion-joint locations, keyed details, and attachments to other work. Distinguish between plant- and field-assembled work.
   C. Samples: For each type of roof specialty and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS
   A. Product Test Reports: For tests performed by a qualified testing agency.
   B. Sample warranty.

1.4 CLOSEOUT SUBMITTALS
   A. Maintenance Data: For roofing specialties to include in maintenance manuals.

1.5 QUALITY ASSURANCE
   A. Manufacturer Qualifications: A qualified manufacturer offering products meeting requirements that are FM Approvals listed for specified class.

1.6 WARRANTY
   A. Roofing-System Warranty: Roof specialties are included in warranty provisions in Section 07 5423 "Thermoplastic Polyolefin (TPO) roofing".
   B. Special Warranty on Painted Finishes: Manufacturer agrees to repair finish or replace roof specialties that show evidence of deterioration of factory-applied finishes within specified warranty period.
      1. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
         a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. SPRI Wind Design Standard: Manufacture and install roof-edge specialties tested according to SPRI ES-1 and capable of resisting the design pressures on the project site.

B. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of thermal movements. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

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

2.2 ROOF-EDGE SPECIALTIES

A. Canted Roof-Edge Fascia and Gravel Stop: Manufactured, two-piece, roof-edge fascia consisting of compression-clamped metal fascia cover in section lengths not exceeding 12 feet (3.6 m) and a continuous formed galvanized-steel sheet cant, 0.028 inch (0.71 mm) thick, minimum, with extended vertical leg terminating in a drip-edge cleat. Provide matching corner units.

1. Metallic-Coated Steel Sheet Fascia Covers: Zinc-coated (galvanized) steel, nominal thickness as required to meet performance requirements.
   a. Surface: Smooth, flat finish.
   b. Finish: Two-coat fluoropolymer.
   c. Color: As selected by Architect from manufacturer’s full range.

2. Corners: Factory mitered and soldered or continuously welded or mechanically clinched and sealed watertight.

3. Splice Plates: Concealed, of same material, finish, and shape as fascia cover.

4. Fascia Accessories: Overflow scuppers, Spillout scuppers, Downspout scuppers with integral conductor head and downspout adapters.

B. One-Piece Gravel Stops: Manufactured, one-piece, metal gravel stop in section lengths not exceeding 12 feet (3.6 m), with a horizontal flange and vertical leg terminating in a drip edge, and concealed splice plates of same material, finish, and shape as gravel stop. Provide matching corner units.

1. Metallic-Coated Steel Sheet Gravel Stops: Zinc-coated (galvanized) steel, nominal 0.034-inch (0.86-mm) thickness
a. Surface: Smooth, flat finish.
b. Finish: Two-coat fluoropolymer.
c. Color: As selected by Architect from manufacturer's full range.

2. Corners: Factory mitered and soldered or continuously welded or mechanically clinched and sealed watertight.

### 2.3 ROOF-EDGE DRAINAGE SYSTEMS

A. Gutters: Manufactured in uniform section lengths not exceeding **12 feet** (**3.6 m**), with matching corner units, ends, outlet tubes, and other accessories. Elevate back edge at least **1 inch** (**25 mm**) above front edge. Furnish flat-stock gutter straps, gutter brackets, expansion joints, and expansion-joint covers fabricated from same metal as gutters.

1. Zinc-Coated Steel: Nominal **0.034-inch (0.86-mm)** thickness.

2. Gutter Profile: As indicated

3. Corners: Factory mitered and soldered or continuously welded or mechanically clinched and sealed watertight.

4. Gutter Supports: Manufacturer's standard supports as selected by Architect with finish matching the gutters.

B. Downspouts: Plain rectangular complete with mitered elbows, manufactured from the following exposed metal. Furnish with metal hangers, from same material as downspouts, and anchors.

1. Zinc-Coated Steel: Nominal **0.034-inch (0.86-mm)** thickness.

C. Parapet Scuppers: Manufactured with closure flange trim to exterior, **4-inch (100-mm)**-wide wall flanges to interior, and base extending **4 inches (100 mm)** beyond cant or tapered strip into field of roof.

1. Zinc-Coated Steel: Nominal **0.034-inch (0.86-mm)** thickness.

D. Conductor Heads: Manufactured conductor heads, each with flanged back and stiffened top edge, and of dimensions and shape indicated, complete with outlet tube that nests into upper end of downspout, exterior flange trim, and built-in overflow.

1. Zinc-Coated Steel: Nominal **0.034-inch (0.86-mm)** thickness.

E. Zinc-Coated Steel Finish: Two-coat fluoropolymer.

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

### 2.4 REGLETS AND COUNTERFLASHINGS

A. Manufacturers: Subject to compliance with requirements, provide products by the following:

1. **Fry Reglet Corporation**.

2. Reglets: Manufactured units formed to provide secure interlocking of separate reglet and counterflashing pieces, from the following exposed metal:

3. Zinc-Coated Steel: Nominal **0.028-inch (0.71-mm)** thickness.
4. Corners: Factory mitered and soldered or continuously welded or mechanically clinched and sealed watertight.

5. Surface-Mounted Type: Provide reglets with slotted holes for fastening to substrate, with neoprene or other suitable weatherproofing washers, and with channel for sealant at top edge.

6. Stucco Type, Embedded: Provide reglets with upturned fastening flange and extension leg of length to match thickness of applied finish materials.

7. Concrete Type, Embedded: Provide temporary closure tape to keep reglet free of concrete materials, special fasteners for attaching reglet to concrete forms, and guides to ensure alignment of reglet section ends.

8. Masonry Type, Embedded: Provide reglets with offset top flange for embedment in masonry mortar joint.

B. Counterflashings: Manufactured units of heights to overlap top edges of base flashings by 4 inches (100 mm) and in lengths not exceeding 12 feet (3.6 m) designed to snap into reglets or through-wall-flashing receiver and compress against base flashings with joints lapped, from the following exposed metal:

1. Zinc-Coated Steel: Nominal 0.028-inch (0.71-mm) thickness.

C. Accessories:

1. Flexible-Flashing Retainer: Provide resilient plastic or rubber accessory to secure flexible flashing in reglet where clearance does not permit use of standard metal counterflashing or where reglet is provided separate from metal counterflashing.

2. Counterflashing Wind-Restraint Clips: Provide clips to be installed before counterflashing to prevent wind uplift of counterflashing lower edge.

D. Zinc-Coated Steel Finish: Two-coat fluoropolymer.

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

2.5 MATERIALS

A. Zinc-Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, G90 (Z275) coating designation.

2.6 UNDERLAYMENT MATERIALS

A. Self-Adhering, High-Temperature Sheet: Minimum 30 to 40 mils (0.76 to 1.0 mm) thick, consisting of slip-resisting polyethylene-film top surface laminated to layer of butyl or SBS-modified asphalt adhesive, with release-paper backing; cold applied. Provide primer when recommended by underlayment manufacturer.


B. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt, nonperforated.
C. Slip Sheet: Rosin-sized building paper, 3-lb/100 sq. ft. (0.16-kg/sq. m) minimum.

2.7 MISCELLANEOUS MATERIALS

A. Fasteners: Manufacturer’s recommended fasteners, suitable for application and designed to meet performance requirements. Furnish the following unless otherwise indicated:
   1. Exposed Penetrating Fasteners: Gasketed screws with hex washer heads matching.
   2. Fasteners for Zinc-Coated (Galvanized) Steel Sheet: Series 300 stainless steel or hot-dip zinc-coated steel according to ASTM A 153/A 153M or ASTM F 2329.

B. Elastomeric Sealant: ASTM C 920, elastomeric silicone polymer sealant of type, grade, class, and use classifications required by roofing-specialty manufacturer for each application.

C. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type joints with limited movement.

D. Bituminous Coating: Cold-applied asphalt emulsion complying with ASTM D 1187/D 1187M.


2.8 FINISHES

A. Coil-Coated Galvanized-Steel Sheet Finishes:
   1. High-Performance Organic Finish: Prepare, pretreat, and apply coating to exposed metal surfaces to comply with ASTM A 755/A 755M and coating and resin manufacturers’ written instructions.
      a. Two-Coat Fluoropolymer: AAMA 621. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat.

PART 3 - EXECUTION

3.1 UNDERLAYMENT INSTALLATION

A. Self-Adhering Sheet Underlayment: Apply primer if required by manufacturer. Comply with temperature restrictions of underlayment manufacturer for installation. Apply wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches (152 mm) staggered 24 inches (610 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps with roller. Cover underlayment within 14 days.
   1. Apply continuously under roof-edge specialties and reglets and counterflashings.
   2. Coordinate application of self-adhering sheet underlayment under roof specialties with requirements for continuity with adjacent air barrier materials.

B. Felt Underlayment: Install with adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).
C. Slip Sheet: Install with tape or adhesive for temporary anchorage to minimize use of mechanical fasteners under roof specialties. Apply in shingle fashion to shed water, with lapped joints of not less than 2 inches (50 mm).

3.2 INSTALLATION, GENERAL
A. General: Install roof specialties according to manufacturer's written instructions. Anchor roof specialties securely in place, with provisions for thermal and structural movement. Use fasteners, solder, protective coatings, separators, underlayments, sealants, and other miscellaneous items as required to complete roof-specialty systems.

1. Install roof specialties level, plumb, true to line and elevation; with limited oil-canning and without warping, jogs in alignment, buckling, or tool marks.
2. Provide uniform, neat seams with minimum exposure of solder and sealant.
3. Install roof specialties to fit substrates and to result in weathertight performance. Verify shapes and dimensions of surfaces to be covered before manufacture.
4. Torch cutting of roof specialties is not permitted.
5. Do not use graphite pencils to mark metal surfaces.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum roof specialties with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Bed flanges in thick coat of asphalt roofing cement where required by manufacturers of roof specialties for waterproof performance.


1. Space movement joints at a maximum of 12 feet (3.6 m) with no joints within 18 inches (450 mm) of corners or intersections unless otherwise indicated on Drawings.
2. When ambient temperature at time of installation is between 40 and 70 deg F (4 and 21 deg C), set joint members for 50 percent movement each way. Adjust setting proportionately for installation at higher ambient temperatures.

D. Fastener Sizes: Use fasteners of sizes that penetrate [wood blocking or sheathing not less than 1-1/4 inches (32 mm) for nails and not less than 3/4 inch (19 mm) for wood screws substrate not less than recommended by fastener manufacturer to achieve maximum pull-out resistance.

E. Seal concealed joints with butyl sealant as required by roofing-specialty manufacturer.

F. Seal joints as required for weathertight construction. Place sealant to be completely concealed in joint. Do not install sealants at temperatures below 40 deg F (4 deg C).

G. Soldered Joints: Clean surfaces to be soldered, removing oils and foreign matter. Pre-tin edges of sheets to be soldered to a width of 1-1/2 inches (38 mm); however, reduce pre-tinning where pre-tinned surface would show in completed Work. Tin edges of uncoated copper sheets using solder for copper. Do not use torches for soldering. Heat surfaces to
receive solder and flow solder into joint. Fill joint completely. Completely remove flux and spatter from exposed surfaces.

3.3 ROOF-EDGE SPECIALITIES INSTALLATION
A. Install cleats, cants, and other anchoring and attachment accessories and devices with concealed fasteners.
B. Anchor roof edgings with manufacturer's required devices, fasteners, and fastener spacing to meet performance requirements.

3.4 ROOF-EDGE DRAINAGE-SYSTEM INSTALLATION
A. General: Install components to produce a complete roof-edge drainage system according to manufacturer's written instructions. Coordinate installation of roof perimeter flashing with installation of roof-edge drainage system.
B. Gutters: Join and seal gutter lengths. Allow for thermal expansion. Attach gutters to firmly anchored gutter supports spaced not more than 24 inches (610 mm) apart. Attach ends with rivets and seal with sealant or solder to make watertight. Slope to downspouts.
   1. Install gutter with expansion joints at locations indicated but not exceeding 50 feet (15.2 m) apart. Install expansion-joint caps.
C. Downspouts: Join sections with manufacturer's standard telescoping joints. Provide hangers with fasteners designed to hold downspouts securely to walls and 1 inch (25 mm) away from walls; locate fasteners at top and bottom and at approximately 60 inches (1500 mm) o.c.
   1. Provide elbows at base of downspouts at grade to direct water away from building.
   2. Connect downspouts to underground drainage system indicated.
D. Parapet Scuppers: Install scuppers through parapet where indicated. Continuously support scupper, set to correct elevation, and seal flanges to interior wall face, over cants or tapered edge strips, and under roofing membrane.
E. Conductor Heads: Anchor securely to wall with elevation of conductor top edge 1 inch (25 mm) below scupper or gutter discharge.

3.5 REGLET AND COUNTERFLASHING INSTALLATION
A. Embedded Reglets: See Section 03 3000 "Cast-in-Place Concrete" and Section 04 2000 "Unit Masonry" for installation of reglets.
B. Surface-Mounted Reglets: Install reglets to receive flashings where flashing without embedded reglets is indicated on Drawings. Install at height so that inserted counterflashings overlap 4 inches (100 mm) over top edge of base flashings.
C. Counterflashings: Insert counterflashings into reglets or other indicated receivers; ensure that counterflashings overlap 4 inches (100 mm) over top edge of base flashings. Lap counterflashjoint a minimum of 4 inches (100 mm) and bed with butyl sealant. Fit counterflashings tightly to base flashings.
3.6 CLEANING AND PROTECTION

A. Clean exposed metal surfaces of substances that interfere with uniform oxidation and weathering.

B. Clean and neutralize flux materials. Clean off excess solder and sealants.

C. Remove temporary protective coverings and strippable films as roof specialties are installed.

END OF SECTION 07 7100
SECTION 07 7200 - ROOF ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Roof curbs.
      2. Equipment supports.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of roof accessory.
   B. Shop Drawings: For roof accessories.
   C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS
   A. Sample warranties.

1.4 CLOSEOUT SUBMITTALS
   A. Operation and maintenance data.

1.5 WARRANTY
   A. Special Warranty on Painted Finishes: Manufacturer's standard form in which manufacturer agrees to repair finishes or replace roof accessories that show evidence of deterioration of factory-applied finishes within 15 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 ROOF CURBS
   A. Roof Curbs: Internally reinforced roof-curb units capable of supporting superimposed live and dead loads, including equipment loads and other construction indicated on Drawings, bearing continuously on roof structure, and capable of meeting performance requirements; with welded or mechanically fastened and sealed corner joints, straight sides, and integrally formed deck-mounting flange at perimeter bottom.
   B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.
   C. Material: Zinc-coated (galvanized) steel sheet, 0.064 inch (1.63 mm) thick.
      1. Finish: Two-coat fluoropolymer or Baked enamel or powder coat.
2. Color: As selected by Architect from manufacturer's full range.

D. Material: Stainless-steel sheet, **0.078 inch (1.98 mm)** thick.
   1. Finish: Manufacturer's standard.

E. Construction:
   1. Curb Profile: Manufacturer's standard or Profile as indicated on Drawings compatible with roofing system.
   2. Fabricate curbs to minimum height of **12 inches (305 mm)** above roofing surface unless otherwise indicated.
   3. Top Surface: Level top of curb, with roof slope accommodated by sloping deck-mounting flange or by use of leveler frame.
   4. Insulation: Factory insulated with **1-1/2-inch- (38-mm-)** thick glass-fiber board insulation.
   5. Liner: Same material as curb, of manufacturer's standard thickness and finish.
   7. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb, of size and spacing required to meet wind uplift requirements.
   8. Platform Cap: Where portion of roof curb is not covered by equipment, provide weathertight platform cap formed from **3/4-inch (19-mm)** thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.
   9. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as curb.

2.2 EQUIPMENT SUPPORTS

A. Equipment Supports: **Rail-type** metal equipment supports capable of supporting superimposed live and dead loads between structural supports, including equipment loads and other construction indicated on Drawings, spanning between structural supports; capable of meeting performance requirements; with welded or **mechanically fastened and sealed** corner joints and integrally formed structure-mounting flange at bottom.

B. Size: Coordinate dimensions with roughing-in information or Shop Drawings of equipment to be supported.

C. Material: Zinc-coated (galvanized) steel.
   1. Finish: Two-coat fluoropolymer or Baked enamel or powder coat.
   2. Color: As selected by Architect from manufacturer's full range.

D. Material: Stainless-steel.
   1. Finish: Manufacturer's standard.

E. Construction:
1. Curb Profile: Manufacturer's standard or Profile as indicated on Drawings compatible with roofing system.

2. Insulation: Factory insulated with 1-1/2-inch- (38-mm-) thick glass-fiber board insulation.

3. Liner: Same material as equipment support, of manufacturer's standard thickness and finish.

4. Nailer: Factory-installed continuous wood nailers 3-1/2 inches (90 mm) wide on top flange of equipment supports, continuous around support perimeter.

5. Wind Restraint Straps and Base Flange Attachment: Provide wind restraint straps, welded strap connectors, and base flange attachment to roof structure at perimeter of curb of size and spacing required to meet wind uplift requirements.

6. Platform Cap: Where portion of equipment support is not covered by equipment, provide weathertight platform cap formed from 3/4-inch (19-mm) thick plywood covered with metal sheet of same type, thickness, and finish as required for curb.

7. Metal Counterflashing: Manufacturer's standard, removable, fabricated of same metal and finish as equipment support.

8. Fabricate equipment supports to minimum height of 12 inches (305 mm) above roofing surface unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Verify dimensions of roof openings for roof accessories. Install roof accessories according to manufacturer's written instructions.

1. Install roof accessories level; plumb; true to line and elevation; and without warping, jogs in alignment, buckling, or tool marks.

2. Anchor roof accessories securely in place so they are capable of resisting indicated loads.

3. Use fasteners, separators, sealants, and other miscellaneous items as required to complete installation of roof accessories and fit them to substrates.

4. Install roof accessories to resist exposure to weather without failing, rattling, leaking, or loosening of fasteners and seals.

B. Metal Protection: Protect metals against galvanic action by separating dissimilar metals from contact with each other or with corrosive substrates by painting contact surfaces with bituminous coating or by other permanent separation as recommended by manufacturer.

1. Coat concealed side of uncoated aluminum and stainless-steel roof accessories with bituminous coating where in contact with wood, ferrous metal, or cementitious construction.
2. Underlayment: Where installing roof accessories directly on cementitious or wood substrates, install a course of underlayment and cover with manufacturer's recommended slip sheet.

C. Seal joints with elastomeric or butyl sealant as required by roof accessory manufacturer.

3.2 REPAIR AND CLEANING

A. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing according to ASTM A 780/A 780M.

B. Touch up factory-primed surfaces with compatible primer ready for field painting according to Section 09 9113 "Exterior Painting."

C. Clean exposed surfaces according to manufacturer's written instructions.

D. Replace roof accessories that have been damaged or that cannot be successfully repaired by finish touchup or similar minor repair procedures.

END OF SECTION 07 7200
SECTION 07 8413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Penetrations in fire-resistance-rated walls.
   2. Penetrations in horizontal assemblies.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.
B. LEED Submittals:
   1. Product Data for penetration firestopping sealants and sealant primers, documentation including printed statement of VOC content.
   2. Laboratory Test Reports for penetration firestopping sealants and sealant primers, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
C. Product Schedule: For each penetration firestopping system. Include location and design designation of qualified testing and inspecting agency.
   1. Where Project conditions require modification to a qualified testing and inspecting agency's illustration for a particular penetration firestopping condition, submit illustration, with modifications marked, approved by penetration firestopping manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

1.3 INFORMATIONAL SUBMITTALS
A. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.
B. Product test reports.

1.4 QUALITY ASSURANCE
A. Fire-Test-Response Characteristics: Penetration firestopping shall comply with the following requirements:
   1. Penetration firestopping tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Penetration firestopping is identical to those tested per testing standard referenced in "Penetration Firestopping" Article. Provide rated systems bearing marking of qualified testing and inspection agency.

B. Preinstallation Conference: Conduct conference at Project site.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. 3M Fire Protection Products.
2. Hilti, Inc.
3. Johns Manville; a Berkshire Hathaway company.

2.2 PENETRATION FIRESTOPPING

A. Provide penetration firestopping that is produced and installed to resist spread of fire according to requirements indicated, resist passage of smoke and other gases, and maintain original fire-resistance rating of construction penetrated. Penetration firestopping systems shall be compatible with one another, with the substrates forming openings, and with penetrating items if any.

B. Penetrations in Fire-Resistance-Rated Walls: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg (2.49 Pa).

1. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
2. T-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated except for floor penetrations within the cavity of a wall.

D. Exposed Penetration Firestopping: Provide products with flame-spread and smoke-developed indexes of less than 25 and 450, respectively, as determined per ASTM E 84.

E. VOC Content: Penetration firestopping sealants and sealant primers shall comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.
F. Low-Emitting Materials: Penetration firestopping sealants and sealant primers 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."

G. Accessories: Provide components for each penetration firestopping system that are needed to install fill materials and to maintain ratings required. Use only those components specified by penetration firestopping manufacturer and approved by qualified testing and inspecting agency for firestopping indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

B. Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

C. Install forming materials and other accessories of types required to support fill materials during their application and in the position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of firestopping.

D. Install fill materials for firestopping by proven techniques to produce the following results:

1. Fill voids and cavities formed by openings, forming materials, accessories, and penetrating items as required to achieve fire-resistance ratings indicated.

2. Apply materials so they contact and adhere to substrates formed by openings and penetrating items.

3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.2 IDENTIFICATION

A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches (150 mm) of firestopping edge so labels will be visible to anyone seeking to remove penetrating items or firestopping. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Penetration Firestopping - Do Not Disturb. Notify Building Management of Any Damage."

2. Contractor's name, address, and phone number.
3. Designation of applicable testing and inspecting agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

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

3.4 PENETRATION FIRESTOPPING
   A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory". Any penetrations in a UL assembly is to be firestopped in accordance with the designated assembly guidelines. Penetrations in UL assemblies include but are not limited to:
   B. Metallic Pipes, Conduit, Tubing
   C. Nonmetallic Pipe, Conduit, or Tubing
   D. Electrical Cables
   E. Cable Trays with Electric Cables
   F. Insulated Pipes
   G. Miscellaneous Electrical Penetrants
   H. Miscellaneous Mechanical Penetrants
   I. Groupings of Penetrants

END OF SECTION 07 8413
SECTION 07 9200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Silicone joint sealants.
   2. Nonstaining silicone joint sealants.
   3. Urethane joint sealants.
   5. Latex joint sealants.

1.2 PREINSTALLATION MEETINGS
A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS
A. Product Data: For each joint-sealant product.
B. LEED Submittals:
   1. Product Data for sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.
   2. Laboratory Test Reports for sealants and sealant primers used inside the weatherproofing system, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health’s (formerly, the California Department of Health Services’) “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.”
C. Samples: For each kind and color of joint sealant required.
D. Joint-Sealant Schedule: Include the following information:
   1. Joint-sealant application, joint location, and designation.
   2. Joint-sealant manufacturer and product name.

1.4 INFORMATIONAL SUBMITTALS
A. Product test reports.
B. Preconstruction laboratory test reports.
C. Preconstruction field-adhesion-test reports.
D. Sample warranties.

1.5 QUALITY ASSURANCE
A. Testing Agency Qualifications: Qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 PRECONSTRUCTION TESTING
A. Preconstruction Laboratory Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.
   1. Adhesion Testing: Use ASTM C 794 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
   2. Compatibility Testing: Use ASTM C 1087 to determine sealant compatibility when in contact with glazing and gasket materials.
   3. Stain Testing: Use ASTM C 1248 to determine stain potential of sealant when in contact with masonry or cementitious fiberboard substrates.

1.7 WARRANTY
A. Special Installer's Warranty: Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Two years from date of Substantial Completion.
B. Special Manufacturer's Warranty: Manufacturer agrees to furnish joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
   1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 JOINT SEALANTS, GENERAL
A. VOC Content of Interior Sealants: Sealants and sealant primers used inside the weatherproofing system shall comply with the following:
   1. Architectural sealants shall have a VOC content of 250 g/L or less.
   2. Sealants and sealant primers for nonporous substrates shall have a VOC content of 250 g/L or less.
3. Sealants and sealant primers for nonporous substrates shall have a VOC content of 775 g/L or less.

B. Low-Emitting Interior Sealants: Sealants and sealant primers shall comply with the testing and product requirements of the California Department of Health’s (formerly, the California Department of Health Services’) “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.”

C. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer’s full range.

2.2 SILICONE JOINT SEALANTS

A. Silicone, S, NS, 100/50, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

B. Silicone, S, NS, 50, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

C. Silicone, S, NS, 35, NT: Single-component, nonsag, plus 35 percent and minus 35 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 35, Use NT.

D. Silicone, S, NS, 25, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

E. Silicone, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.

F. Silicone, S, NS, 50, T, NT: Single-component, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Uses T and NT.

G. Silicone, S, NS, 25, T, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Uses T and NT.

H. Silicone, S, P, 100/50, T, NT: Single-component, pourable, plus 100 percent and minus 50 percent movement capability traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 100/50, Uses T and NT.

I. Silicone, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.

J. Silicone, M, P, 100/50, T, NT: Multicomponent, pourable, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type M, Grade P, Class 100/50, Uses T and NT.
2.3 NONSTAINING SILICONE JOINT SEALANTS

A. Nonstaining Joint Sealants: No staining of substrates when tested according to ASTM C 1248.

B. Silicone, Nonstaining, S, NS, 100/50, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.

C. Silicone, Nonstaining, S, NS, 50, NT: Nonstaining, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Use NT.

D. Silicone, Nonstaining, S, NS, 100/50, T, NT: Nonstaining, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.

E. Silicone, Nonstaining, M, NS, 50, NT: Nonstaining, multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability, nontraffic-use, neutral-curing silicone joint sealant; ASTM C 920, Type M, Grade NS, Class 50, Use NT.

2.4 URETHANE JOINT SEALANTS

A. Urethane, S, NS, 25, NT: Single-component, nonsag, nontraffic-use, plus 25 percent and minus 25 percent movement capability, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

B. Urethane, S, NS, 100/50, T, NT: Single-component, nonsag, plus 100 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses T and NT.

C. Urethane, S, NS, 25, T, NT: Single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Uses T and NT.

D. Urethane, S, P, 35, T, NT: Single-component, pourable, plus 35 percent and minus 35 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 35, Uses T and NT.

E. Urethane, S, P, 25, T, NT: Single-component, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 25, Uses T and NT.

F. Urethane, M, NS, 50, NT: Multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 50, Use NT.

G. Urethane, M, NS, 25, NT: Multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 25, Use NT.

H. Urethane, M, NS, 50, T, NT: Multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 50, Uses T and NT.
I. Urethane, M, NS, 25, T, NT: Multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 25, Uses T and NT.

J. Urethane, M, P, 50, T, NT: Multicomponent, pourable, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 50, Uses T and NT.

K. Urethane, M, P, 25, T, NT: Multicomponent, pourable, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade P, Class 25, Uses T and NT.

2.5 IMMERSIBLE JOINT SEALANTS

A. Immersible Joint Sealants. Suitable for immersion in liquids; ASTM C 1247, Class 1; tested in deionized water unless otherwise indicated

B. Urethane, Immersible, S, NS, 100/50, NT, I: Immersible, single-component, nonsag, plus 100 percent and minus 50 percent movement capability, nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 100/50, Uses NT, and I.

C. Urethane, Immersible, S, NS, 35, NT, I: Immersible, single-component, nonsag, plus 35 percent and minus 35 percent movement capability, nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 35, Use NT and I.

D. Urethane, Immersible, S, NS, 50, T, NT, I: Immersible, single-component, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 50, Uses T, NT, and I.

E. Urethane, Immersible, S, NS, 35, T, NT, I: Immersible, single-component, nonsag, plus 35 percent and minus 35 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 35, Uses T, NT, and I.

F. Urethane, Immersible, S, NS, 25, T, NT, I: Immersible, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Uses T, NT, and I.

G. Urethane, Immersible, S, P, 50, T, NT, I: Immersible, single-component, pourable, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type S, Grade P, Class 50, Uses T, NT, and I.


I. Urethane, Immersible, M, NS, 50, T, NT, I: Immersible, multicomponent, nonsag, plus 50 percent and minus 50 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 50, Uses T, NT, and I.

J. Urethane, Immersible, M, NS, 25, T, NT, I: Immersible, multicomponent, nonsag, plus 25 percent and minus 25 percent movement capability, traffic- and nontraffic-use, urethane joint sealant; ASTM C 920, Type M, Grade NS, Class 25, Uses T, NT, and I.

2.6 MILDEW-RESISTANT JOINT SEALANTS
A. Mildew-Resistant Joint Sealants: Formulated for prolonged exposure to humidity with fungicide to prevent mold and mildew growth.
B. Silicone, Mildew Resistant, Acid Curing, S, NS, 25, NT: Mildew-resistant, single-component, nonsag, plus 25 percent and minus 25 percent movement capability, nontraffic-use, acid-curing silicone joint sealant; ASTM C 920, Type S, Grade NS, Class 25, Use NT.

2.7 LATEX JOINT SEALANTS
A. Acrylic Latex: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

2.8 JOINT-SEALANT BACKING
A. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) Type B (bicellular material with a surface skin) or any of the preceding types, as approved in writing by joint-sealant manufacturer for joint application indicated, and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance.
B. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer.

2.9 MISCELLANEOUS MATERIALS
A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.
B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION
A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer’s written instructions and the following requirements:
   1. Remove laitance and form-release agents from concrete.
   2. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion.
B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF JOINT SEALANTS

A. General: Comply with ASTM C 1193 and joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

C. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

D. Install sealants using proven techniques that comply with the following and at the same time backings are installed:
   1. Place sealants so they directly contact and fully wet joint substrates.
   2. Completely fill recesses in each joint configuration.
   3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

E. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants to form smooth, uniform beads of configuration indicated. Use tooling agents that are approved in writing by sealant manufacturer and that do not discolor sealants or adjacent surfaces.
   1. Provide concave joint profile per Figure 8A in ASTM C 1193 unless otherwise indicated.

3.3 FIELD QUALITY CONTROL

A. Field-Adhesion Testing: Field test joint-sealant adhesion to joint substrates as follows:
   1. Extent of Testing: Test completed and cured sealant joints as follows:
      a. Perform 10 tests for the first 1000 feet (300 m) of joint length for each kind of sealant and joint substrate.
      b. Perform one test for each 1000 feet (300 m) of joint length thereafter or one test per each floor per elevation.

B. Evaluation of Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing or noncompliance with other indicated requirements will be considered satisfactory. Remove sealants that fail to adhere to joint substrates during testing or to comply with other...
requirements. Retest failed applications until test results prove sealants comply with indicated requirements.

3.4 JOINT-SEALANT SCHEDULE

A. All Joint-Sealant colors to be selected by Architect from manufacturer's full range of colors.

B. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces.
   1. Joint Locations:
      a. Isolation and contraction joints in cast-in-place concrete slabs.
      b. Tile control and expansion joints.
      c. Joints between different materials listed above.
      d. Other joints as indicated on Drawings.

C. Joint-Sealant Application: Exterior joints in horizontal traffic surfaces subject to water immersion.
   1. Joint Locations:
      a. Joints in pedestrian plazas.
      b. Other joints as indicated on Drawings.

   1. Joint Locations:
      b. Control and expansion joints in unit masonry.
      c. Other joints as indicated on Drawings.
   2. Joint Sealant: Silicone, nonstaining, S, NS, 50, NT.

E. Joint-Sealant Application: Interior joints in horizontal traffic surfaces.
   1. Joint Locations:
      a. Control and expansion joints in tile flooring.
      b. Other joints as indicated on Drawings.

F. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces.
   1. Joint Locations:
      a. Control and expansion joints on exposed interior surfaces of exterior walls.
      b. Tile control and expansion joints.
c. Vertical joints on exposed surfaces of unit masonry and concrete walls and framed partitions.

d. Other joints as indicated on Drawings.

2. Joint Sealant: Urethane, S, NS, 25, NT.

G. Joint-Sealant Application: Interior joints in vertical surfaces and horizontal nontraffic surfaces not subject to significant movement.

1. Joint Locations:
   a. Control joints on exposed interior surfaces of exterior walls.
   b. Perimeter joints between interior wall surfaces and frames of interior doors, windows and elevator entrances.
   c. Other joints as indicated on Drawings.


H. Joint-Sealant Application: Mildew-resistant interior joints in vertical surfaces and horizontal nontraffic surfaces.

1. Joint Locations:
   a. Joints between plumbing fixtures and adjoining walls, floors, and counters.
   b. Tile control and expansion joints where indicated.
   c. Other joints as indicated on Drawings.

2. Joint Sealant: Silicone, mildew resistant, acid curing, S, NS, 25, NT.

I. Joint-Sealant Application: Concealed mastics.

1. Joint Locations:
   a. Aluminum thresholds.
   b. Sill plates.
   c. Other joints as indicated on Drawings.


END OF SECTION 07 9200
PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes acoustical joint sealants.

1.2 ACTION SUBMITTALS
   A. Product Data: For each acoustical joint sealant.
   B. LEED Submittals:
      1. Product Data for sealants and sealant primers used inside the weatherproofing system, documentation including printed statement of VOC content.
      2. Laboratory Test Reports for sealants and sealant primers used inside the weatherproofing system, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
   C. Samples: For each kind and color of acoustical joint sealant required.
   D. Acoustical-Joint-Sealant Schedule: Include the following information:
      1. Joint-sealant application, joint location, and designation.
      2. Joint-sealant manufacturer and product name.

1.3 INFORMATIONAL SUBMITTALS
   A. Product test reports.
   B. Sample warranties.

1.4 WARRANTY
   A. Special Installer's Warranty: Installer agrees to repair or replace acoustical joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
      1. Warranty Period: Two years from date of Substantial Completion.
   B. Special Manufacturer's Warranty: Manufacturer agrees to furnish acoustical joint sealants to repair or replace those joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.
      1. Warranty Period: Five years from date of Substantial Completion.
PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Provide acoustical joint-sealant products that effectively reduce airborne sound transmission through perimeter joints and openings in building construction, as demonstrated by testing representative assemblies according to ASTM E 90.
   B. VOC Content of Interior Sealants: Sealants and sealant primers shall comply with the following:
      1. Acoustical sealants and sealant primers shall have a VOC content of 250 g/L or less.
   C. Low-Emitting Interior Sealants: Acoustical sealants and sealant primers shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.2 ACOUSTICAL JOINT SEALANTS
   A. Acoustical Sealant: Manufacturer's standard nonsag, paintable, nonstaining latex acoustical sealant complying with ASTM C 834.
      1. Colors of Exposed Acoustical Joint Sealants: As selected by Architect from manufacturer's full range of colors.
   B. Primer: Material recommended by acoustical-joint-sealant manufacturer where required for adhesion of sealant to joint substrates.
   C. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials.
   D. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 PREPARATION
   A. Surface Cleaning of Joints: Clean out joints immediately before installing acoustical joint sealants to comply with joint-sealant manufacturer's written instructions.
   B. Joint Priming: Prime joint substrates where recommended by acoustical-joint-sealant manufacturer.
   C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces.

3.2 INSTALLATION OF ACOUSTICAL JOINT SEALANTS
   A. Comply with acoustical joint-sealant manufacturer's written installation instructions unless more stringent requirements apply.
B. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical joint sealant. Install acoustical joint sealants at both faces of partitions, at perimeters, and through penetrations. Comply with ASTM C 919, ASTM C 1193, and manufacturer's written recommendations for closing off sound-flanking paths around or through assemblies, including sealing partitions to underside of floor slabs above acoustical ceilings.

C. Acoustical Ceiling Areas: Apply acoustical joint sealant at perimeter edge moldings of acoustical ceiling areas in a continuous ribbon concealed on back of vertical legs of moldings before they are installed.

END OF SECTION 07 9219
SECTION 08 1113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes hollow-metal work.

1.2 DEFINITIONS
   A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Shop Drawings: Include elevations, door edge details, frame profiles, metal thicknesses, preparations for hardware, and other details.
   C. Samples for Initial Selection: For units with factory-applied color finishes.
   D. Samples for Verification: For each type of exposed finish required.
   E. Schedule: Prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings.

1.4 INFORMATIONAL SUBMITTALS
   A. Product test reports.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
   A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      1. Amweld International, LLC.
      2. Steelcraft; an Ingersoll-Rand brand.

2.2 REGULATORY REQUIREMENTS
   A. Fire-Rated Assemblies: Complying with NFPA 80 and listed and labeled by a qualified testing agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C.
      1. Smoke- and Draft-Control Assemblies: Provide an assembly with gaskets listed and labeled for smoke and draft control by a qualified testing agency acceptable to
authorities having jurisdiction, based on testing according to UL 1784 and installed in compliance with NFPA 105.

B. Fire-Rated, Borrowed-Lite Assemblies: Complying with NFPA 80 and listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for fire-protection ratings indicated, based on testing according to NFPA 257 or UL 9.

2.3 EXTERIOR HOLLOW-METAL DOORS AND FRAMES

A. Heavy-Duty Doors and Frames: SDI A250.8, Level 2.
   1. Physical Performance: Level B according to SDI A250.4.
   2. Doors:
      a. Type: As indicated in the Door and Frame Schedule.
      b. Thickness: 1-3/4 inches (44.5 mm).
      c. Face: Metallic-coated steel sheet, minimum thickness of 0.042 inch (1.0 mm), with minimum A40 (ZF120) coating.
      d. Edge Construction: Model 2, Seamless.
      e. Core: Polyisocyanurate.
   3. Thermal-Rated Doors: Provide doors fabricated with thermal-resistance value (R-value) of not less than 2.1 deg F x h x sq. ft./Btu (0.370 K x sq. m/W) when tested according to ASTM C 1363.
   4. Frames:
      a. Materials: Metallic-coated steel sheet, minimum thickness of 0.053 inch (1.3 mm), with minimum A40 (ZF120) coating.
      b. Construction: Full profile welded.

2.4 FRAME ANCHORS

A. Jamb Anchors:
   1. Masonry Type: Adjustable strap-and-stirrup or T-shaped anchors to suit frame size, not less than 0.042 inch (1.0 mm) thick, with corrugated or perforated straps not less than 2 inches (51 mm) wide by 10 inches (254 mm) long; or wire anchors not less than 0.177 inch (4.5 mm) thick.
   2. Stud-Wall Type: Designed to engage stud, welded to back of frames; not less than 0.042 inch (1.0 mm) thick.
   3. Postinstalled Expansion Type for In-Place Concrete or Masonry: Minimum 3/8-inch-(9.5-mm-) diameter bolts with expansion shields or inserts. Provide pipe spacer from frame to wall, with throat reinforcement plate, welded to frame at each anchor location.

B. Floor Anchors: Formed from same material as frames, minimum thickness of 0.042 inch (1.0 mm), and as follows:
1. **Monolithic Concrete Slabs**: Clip-type anchors, with two holes to receive fasteners.

2. **Separate Topping Concrete Slabs**: Adjustable-type anchors with extension clips, allowing not less than 2-inch (51-mm) height adjustment. Terminate bottom of frames at finish floor surface.

2.5 **MATERIALS**

A. **Cold-Rolled Steel Sheet**: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B; suitable for exposed applications.

B. **Hot-Rolled Steel Sheet**: ASTM A 1011/A 1011M, Commercial Steel (CS), Type B; free of scale, pitting, or surface defects; pickled and oiled.

C. **Metallic-Coated Steel Sheet**: ASTM A 653/A 653M, Commercial Steel (CS), Type B.

D. **Frame Anchors**: ASTM A 879/A 879M, Commercial Steel (CS), 04Z (12G) coating designation; mill phosphatized.

   1. For anchors built into exterior walls, steel sheet complying with ASTM A 1008/A 1008M or ASTM A 1011/A 1011M, hot-dip galvanized according to ASTM A 153/A 153M, Class B.

E. **Inserts, Bolts, and Fasteners**: Hot-dip galvanized according to ASTM A 153/A 153M.

F. **Power-Actuated Fasteners in Concrete**: From corrosion-resistant materials.

G. **Grout**: ASTM C 476, except with a maximum slump of 4 inches (102 mm), as measured according to ASTM C 143/C 143M.

H. **Mineral-Fiber Insulation**: ASTM C 665, Type I (blankets without membrane facing).

2.6 **FABRICATION**

A. Fabricate hollow-metal work to be rigid and free of defects, warp, or buckle. Accurately form metal to required sizes and profiles, with minimum radius for metal thickness. Where practical, fit and assemble units in manufacturer's plant. To ensure proper assembly at Project site, clearly identify work that cannot be permanently factory assembled before shipment.

B. **Hollow-Metal Doors**:

   1. **Exterior Doors**: Provide weep-hole openings in bottoms of exterior doors to permit moisture to escape. Seal joints in top edges of doors against water penetration.

C. **Hollow-Metal Frames**: Where frames are fabricated in sections due to shipping or handling limitations, provide alignment plates or angles at each joint, fabricated of same thickness metal as frames.

   1. Provide countersunk, flat- or oval-head exposed screws and bolts for exposed fasteners unless otherwise indicated.

   2. **Grout Guards**: Weld guards to frame at back of hardware mortises in frames to be grouted.
3. Floor Anchors: Weld anchors to bottoms of jambs with at least four spot welds per anchor; however, for slip-on drywall frames, provide anchor clips or countersunk holes at bottoms of jambs.

4. Jamb Anchors: Provide number and spacing of anchors as follows:
   a. Masonry Type: Locate anchors not more than 16 inches (406 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c., to match coursing, and as follows:
      1) Two anchors per jamb up to 60 inches (1524 mm) high.
      2) Three anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
      3) Four anchors per jamb from 90 to 120 inches (2286 to 3048 mm) high.
      4) Four anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 120 inches (3048 mm) high.
   b. Stud-Wall Type: Locate anchors not more than 18 inches (457 mm) from top and bottom of frame. Space anchors not more than 32 inches (813 mm) o.c. and as follows:
      1) Three anchors per jamb up to 60 inches (1524 mm) high.
      2) Four anchors per jamb from 60 to 90 inches (1524 to 2286 mm) high.
      3) Five anchors per jamb from 90 to 96 inches (2286 to 2438 mm) high.
      4) Five anchors per jamb plus one additional anchor per jamb for each 24 inches (610 mm) or fraction thereof above 96 inches (2438 mm) high.
   c. Compression Type: Not less than two anchors in each frame.
   d. Postinstalled Expansion Type: Locate anchors not more than 6 inches (152 mm) from top and bottom of frame. Space anchors not more than 26 inches (660 mm) o.c.

5. Door Silencers: Except on weather-stripped frames, drill stops to receive door silencers.
   a. Single-Door Frames: Drill stop in strike jamb to receive three door silencers.

D. Hardware Preparation: Factory prepare hollow-metal work to receive templated mortised hardware; include cutouts, reinforcement, mortising, drilling, and tapping according to SDI A250.6, the Door Hardware Schedule, and templates.
   1. Reinforce doors and frames to receive non templated, mortised, and surface-mounted door hardware.
   2. Comply with applicable requirements in SDI A250.6 and BHMA A156.115 for preparation of hollow-metal work for hardware.

2.7 STEEL FINISHES

A. Prime Finish: Clean, pretreat, and apply manufacturer's standard primer.
2.8 ACCESSORIES

A. Grout Guards: Formed from same material as frames, not less than 0.016 inch (0.4 mm) thick.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hollow-Metal Frames: Install hollow-metal frames for doors, transoms, sidelites, borrowed lites, and other openings, of size and profile indicated. Comply with SDI A250.11 or NAAMM-HMMA 840 as required by standards specified.

1. Set frames accurately in position; plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces, leaving surfaces smooth and undamaged.
   a. At fire-rated openings, install frames according to NFPA 80.
   b. Where frames are fabricated in sections because of shipping or handling limitations, field splice at approved locations by welding face joint continuously; grind, fill, dress, and make splice smooth, flush, and invisible on exposed faces.
   c. Install frames with removable stops located on secure side of opening.
   d. Install door silencers in frames before grouting.
   e. Remove temporary braces necessary for installation only after frames have been properly set and secured.
   f. Check plumb, square, and twist of frames as walls are constructed. Shim as necessary to comply with installation tolerances.
   g. Field apply bituminous coating to backs of frames that will be filled with grout containing antifreezing agents.

2. Floor Anchors: Provide floor anchors for each jamb and mullion that extends to floor, and secure with postinstalled expansion anchors.
   a. Floor anchors may be set with power-actuated fasteners instead of postinstalled expansion anchors if so indicated and approved on Shop Drawings.

3. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.

4. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.

5. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.

6. In-Place Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.

7. Installation Tolerances: Adjust hollow-metal door frames for squareness, alignment, twist, and plumb to the following tolerances:
a. Squareness: Plus or minus $1/16$ inch (1.6 mm), measured at door rabbet on a line 90 degrees from jamb perpendicular to frame head.

b. Alignment: Plus or minus $1/16$ inch (1.6 mm), measured at jambs on a horizontal line parallel to plane of wall.

c. Twist: Plus or minus $1/16$ inch (1.6 mm), measured at opposite face corners of jambs on parallel lines, and perpendicular to plane of wall.

d. Plumbness: Plus or minus $1/16$ inch (1.6 mm), measured at jambs at floor.

B. Hollow-Metal Doors: Fit hollow-metal doors accurately in frames, within clearances specified below. Shim as necessary.

1. Non-Fire-Rated Steel Doors:

   a. Between Door and Frame Jambs and Head: $1/8$ inch (3.2 mm) plus or minus $1/32$ inch (0.8 mm).

   b. Between Edges of Pairs of Doors: $1/8$ inch (3.2 mm) to $1/4$ inch (6.3 mm) plus or minus $1/32$ inch (0.8 mm).

   c. At Bottom of Door: $5/8$ inch (15.8 mm) plus or minus $1/32$ inch (0.8 mm).

   d. Between Door Face and Stop: $1/16$ inch (1.6 mm) to $1/8$ inch (3.2 mm) plus or minus $1/32$ inch (0.8 mm).

2. Fire-Rated Doors: Install doors with clearances according to NFPA 80.

3. Smoke-Control Doors: Install doors and gaskets according to NFPA 105.

3.2 ADJUSTING AND CLEANING

A. Final Adjustments: Check and readjust operating hardware items immediately before final inspection. Leave work in complete and proper operating condition. Remove and replace defective work, including hollow-metal work that is warped, bowed, or otherwise unacceptable.

B. Remove grout and other bonding material from hollow-metal work immediately after installation.

C. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

D. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

E. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 08 1113
SECTION 08 1416 – PRE-HUNG FLUSH WOOD DOORS

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Pre-hung Solid-core doors with wood-veneer faces.
      2. Pre-hung Hollow-core doors with wood-veneer.
      3. Pre-hung Fiberglass doors with insulated glass lite.
      4. Factory finishing flush wood doors.
      5. Factory fitting flush wood doors to frames and factory machining for hardware.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of door. Include factory-finishing specifications.
   B. LEED Submittals:
      1. Product Data for adhesives and composite wood products, documentation indicating that product contains no urea formaldehyde.
      2. Laboratory Test Reports for adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
      3. Laboratory Test Reports for paints and coatings, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
      4. Laboratory Test Reports for composite wood products, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

1.3 INFORMATIONAL SUBMITTALS
   A. Quality Standard Compliance Certificates.

1.4 WARRANTY
   A. Warranty: Manufacturer agrees to repair or replace components of door system that fail in materials or workmanship within specified warranty period.
      1. Warranty Period: twenty-five (10) years from date of Substantial Completion.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Subject to compliance with requirements, provide products by one of the following or equal:
   1. Masonite
   2. Framesaver Door Frames by Endura

2.2 FLUSH WOOD DOORS, GENERAL

A. Quality Standard: In addition to requirements specified, comply with WDMA I.S.1-A, "Architectural Wood Flush Doors."
   1. Provide labels indicating that doors comply with requirements of grades specified.

B. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that do not contain urea formaldehyde.

C. Low-Emitting Materials: Fabricate doors with adhesives and composite wood products that 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."

D. WDMA I.S.1-A Performance Grade:
   1. Standard Duty unless otherwise indicated.
   2. Extra Heavy Duty: public toilets, janitor's closets on ground floor.

E. Particleboard-Core Doors:
   1. Particleboard: ANSI A208.1, Grade LD-1 or Grade LD-2, made with binder containing no urea-formaldehyde.
   2. Blocking: Provide wood blocking in particleboard-core doors as needed to eliminate through-bolting hardware.
   3. Provide doors with glued-wood-stave or structural-composite-lumber cores instead of particleboard cores for doors indicated to receive exit devices.

F. Structural-Composite-Lumber-Core Doors:
      a. Screw Withdrawal, Face: 700 lbf (3100 N).
      b. Screw Withdrawal, Edge: 400 lbf (1780 N).

G. Hollow-Core Doors:

2.3 DOORS FOR OPAQUE FINISH

A. Interior Solid-Core Doors:
   1. Grade: Premium.
2. Faces: Hardboard or MDF.
3. Core: Particleboard or Either glued wood stave or structural composite lumber.
4. Construction: **Five or seven** plies. Stiles and rails are bonded to core, then entire unit is abrasive planed before veneering. **Faces are bonded to core using a hot press.**
5. Construction: **Seven** plies, either bonded or nonbonded.

B. **Interior Hollow-Core Doors:**
   1. Grade: **Premium.**
   2. Faces: Hardboard or MDF.

2.4 **FIBERGLASS DOORS FOR SITE APPLIED FINISH**
   A. Smooth Flush-glazed fiberglass doors with full insulated glass lite:
      1. Grade: Paint
      2. Construction: 7-piece including:
         a. Fiberglass reinforced facings
         b. Laminated lock style,
         c. Laminated wood hinge stile
         d. Wood top rail
         e. Rot resistant composite bottom rain
         f. Internal glazing frame
      3. Insulated core
         a. Poured in place polyurethane foam
      4. Lite: 1” Double pane insulated clear glass lite (0.30 U, 0.30 SHGC)

2.5 **DOOR FRAME JAMBS FOR EXTERIOR EXPOSURES AT RESIDENTIAL UNITS**
   A. Frames comprised of single rabbet jamb of solid wood frames with composite jamb base:
      1. Grade: Paint grade

2.6 **FABRICATION**
   A. Factory fit doors to suit frame-opening sizes indicated. Comply with clearance requirements of referenced quality standard for fitting unless otherwise indicated.
      1. Comply with NFPA 80 requirements for fire-rated doors.
   B. Factory machine doors for hardware that is not surface applied.

2.7 **SHOP PRIMING**
   A. Doors for Opaque Finish: Shop prime faces, all four edges, edges of cutouts, and mortises with one coat of wood primer specified in **Section 09 9123" Interior Painting."**
2.8 FACTORY FINISHING

A. General: Comply with referenced quality standard for factory priming. Complete fabrication, including fitting doors for openings and machining for hardware that is not surface applied, before finishing.
   1. Finish faces, all four edges, edges of cutouts, and mortises. Fillers may be omitted on bottom edges, edges of cutouts, and mortises.

B. Use only paints and coatings that 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."

PART 3 - EXECUTION

3.1 INSTALLATION

A. Hardware: For installation, see Section 08 7100 "Door Hardware."

B. Installation Instructions: Install doors to comply with manufacturer's written instructions and referenced quality standard, and as indicated.
   1. Install smoke- and draft-control doors according to NFPA 105.

C. Factory-Fitted Doors: Align in frames for uniform clearance at each edge.

D. Factory-Finished Doors: Restore finish before installation if fitting or machining is required at Project site.

END OF SECTION 08 1416
SECTION 08 3113 - ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Access doors and frames for walls and ceilings.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.
   C. Samples: For each door face material.
   D. Schedule: Types, locations, sizes, latching or locking provisions, and other data pertinent to installation.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Fire-Rated Access Doors and Frames: Units complying with NFPA 80 tested according to the following test method:
      1. NFPA 252 or UL 10B for fire-rated access door assemblies installed vertically.
      2. NFPA 288 for fire-rated access door assemblies installed horizontally.

2.2 ACCESS DOORS AND FRAMES FOR WALLS AND CEILINGS
   A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      1. Access Panel Solutions.
      2. Acudor Products, Inc.
      4. Larsens Manufacturing Company.
   B. Source Limitations: Obtain each type of access door and frame from single source from single manufacturer.
   C. Flush Access Doors with Concealed Flanges:
      1. Assembly Description: Fabricate door to fit flush to frame. Provide frame with gypsum board beads for concealed flange installation.
2. Locations: Wall and ceiling.
3. Door Size: indicated on drawings or per mechanical unit requirements.
4. Metallic-Coated Steel Sheet for Door: Nominal 0.064 inch (1.63 mm), 16 gage.
5. Frame Material: Same material and thickness as door.

D. Fire-Rated, Flush Access Doors with Concealed Flanges:
1. Assembly Description: Fabricate door to fit flush to frame, with a core of mineral-fiber insulation enclosed in sheet metal. Provide self-latching door with automatic closer and interior latch release. Provide frame with gypsum board beads for concealed flange installation.
2. Locations: Ceiling.
3. Fire-Resistance Rating: Not less than that of adjacent construction.
4. Temperature-Rise Rating: 450 deg F (250 deg C) at the end of 30 minutes.
5. Metallic-Coated Steel Sheet for Door: Nominal 0.040 inch (1.02 mm), 20 gage.
6. Frame Material: Same material, thickness, and finish as door.

E. Hardware:
1. Lock: Cylinder.

2.3 MATERIALS
A. Steel Plates, Shapes, and Bars: ASTM A 36/A 36M.
B. 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.
C. Steel Sheet: Uncoated or electrolytic zinc coated, ASTM A 879/A 879M, with cold-rolled steel sheet substrate complying with ASTM A 1008/A 1008M, Commercial Steel (CS), exposed.
D. Metallic-Coated Steel Sheet: ASTM A 653/A 653M, Commercial Steel (CS), Type B; with minimum G60 (Z180) or A60 (ZF180) metallic coating.
G. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy and temper recommended by aluminum producer and finisher for type of use and finish indicated, and with not less than
strength and durability properties of Alloy 5005-H15; with minimum sheet thickness according to ANSI H35.2 (ANSI H35.2M).

H. Frame Anchors: Same type as door face.
I. Inserts, Bolts, and Anchor Fasteners: Hot-dip galvanized steel according to ASTM A153/A153M or ASTM F2329.

2.4 FABRICATION

A. General: Provide access door and frame assemblies manufactured as integral units ready for installation.
B. Metal Surfaces: For metal surfaces exposed to view in the completed Work, provide materials with smooth, flat surfaces without blemishes. Do not use materials with exposed pitting, seam marks, roller marks, rolled trade names, or roughness.
C. Doors and Frames: Grind exposed welds smooth and flush with adjacent surfaces. Furnish attachment devices and fasteners of type required to secure access doors to types of supports indicated.
D. Recessed Access Doors: Form face of panel to provide recess for application of applied finish. Reinforce panel as required to prevent buckling.
   1. For recessed doors with plaster infill, provide self-furring expanded metal lath attached to door panel.
E. Latching Mechanisms: Furnish number required to hold doors in flush, smooth plane when closed.
   1. For cylinder locks, furnish two keys per lock and key all locks alike.
   2. For recessed panel doors, provide access sleeves for each locking device. Furnish plastic grommets and install in holes cut through finish.
F. Extruded Aluminum: After fabrication, apply manufacturer's standard protective coating on aluminum that will come in contact with concrete.

2.5 FINISHES

A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.
C. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.
D. Steel and Metallic-Coated-Steel Finishes:
   1. Factory Prime: Apply manufacturer's standard, fast-curing, lead- and chromate-free, universal primer immediately after surface preparation and pretreatment.
E. Aluminum Finishes:
1. Clear Anodic Finish: AAMA 611, [AA-M12C22A41, Class I, 0.018 mm] [AA-M12C22A31, Class II, 0.010 mm] or thicker.

PART 3 - EXECUTION

3.1 INSTALLATION
   A. Comply with manufacturer's written instructions for installing access doors and frames.
   B. Install doors flush with adjacent finish surfaces or recessed to receive finish material.

3.2 ADJUSTING
   A. Adjust doors and hardware, after installation, for proper operation.
   B. Remove and replace doors and frames that are warped, bowed, or otherwise damaged.

END OF SECTION 08 3113
SECTION 08 4113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
1. Exterior storefront framing.
2. Exterior manual-swing entrance doors and door-frame units.

1.2 PREINSTALLATION MEETINGS
A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. LEED Submittals:
   1. Product Data for glazing sealants used inside the weatherproofing system, documentation including printed statement of VOC content.
   2. Laboratory Test Reports for glazing sealants used inside the weatherproofing system, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
C. Shop Drawings: Include plans, elevations, sections, full-size details, and attachments to other work.
   1. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.
D. Samples: For each exposed finish required.
E. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams.

1.4 INFORMATIONAL SUBMITTALS
A. Energy Performance Certificates: NFRC-certified energy performance values from manufacturer.
B. Product test reports.
C. Field quality-control reports.
D. Sample warranties.
1.5 CLOSEOUT SUBMITTALS

A. Maintenance data.

1.6 QUALITY ASSURANCE

A. Installer Qualifications: An entity that employs installers and supervisors who are trained and approved by manufacturer.

B. Product Options: Information on Drawings and in Specifications establishes requirements for aesthetic effects and performance characteristics of assemblies. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, to one another, and to adjoining construction.

1. Do not change intended aesthetic effects, as judged solely by Architect, except with Architect's approval. If changes are proposed, submit comprehensive explanatory data to Architect for review.

1.7 WARRANTY

A. Special Warranty: Installer agrees to repair or replace components of aluminum-framed entrances and storefronts that do not comply with requirements or that fail in materials or workmanship within specified warranty period.

1. Warranty Period: 5 years from date of Substantial Completion.

B. Special Finish Warranty: Standard form in which manufacturer agrees to repair finishes or replace aluminum that shows evidence of deterioration of factory-applied finishes within specified warranty period.

1. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. General Performance: Comply with performance requirements specified, as determined by testing of aluminum-framed entrances and storefronts representing those indicated for this Project without failure due to defective manufacture, fabrication, installation, or other defects in construction.

1. Aluminum-framed entrances and storefronts shall withstand movements of supporting structure including, but not limited to, story drift, twist, column shortening, long-term creep, and deflection from uniformly distributed and concentrated live loads.

2. Failure also includes the following:
   a. Thermal stresses transferring to building structure.
   b. Glass breakage.
   c. Noise or vibration created by wind and thermal and structural movements.
   d. Loosening or weakening of fasteners, attachments, and other components.
e. Failure of operating units.

B. Structural Loads:

1. Wind Loads: As indicated on Drawings.
2. Other Design Loads: As indicated on Drawings.

C. Deflection of Framing Members: At design wind pressure, as follows:

1. Deflection Normal to Wall Plane: Limited to [edge of glass in a direction perpendicular to glass plane not exceeding 1/175 of clear span for spans up to 13 feet 6 inches (4.1 m) and to 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 13 feet 6 inches (4.1 m) or an amount that restricts edge deflection of individual glazing lites to 3/4 inch (19.1 mm), whichever is less.
2. Deflection Parallel to Glazing Plane: Limited to 1/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.
   a. Operable Units: Provide a minimum 1/16-inch (1.6-mm) clearance between framing members and operable units.
3. Cantilever Deflection: Where framing members overhang an anchor point, as follows:
   a. Perpendicular to Plane of Wall: No greater than 1/240 of clear span plus 1/4 inch (6.35 mm) for spans greater than 11 feet 8-1/4 inches (3.6 m) or 1/175 times span, for spans less than 11 feet 8-1/4 inches (3.6 m).

D. Air Infiltration: Test according to ASTM E 283 for infiltration as follows:

1. Fixed Framing and Glass Area:
   a. Maximum air leakage of 0.06 cfm/sq. ft. (0.30 L/s per sq. m) at a static-air-pressure differential of 6.24 lbf/sq. ft. (300 Pa).
2. Entrance Doors:
   a. Pair of Doors: Maximum air leakage of 1.0 cfm/sq. ft. (5.08 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).
   b. Single Doors: Maximum air leakage of 0.5 cfm/sq. ft. (2.54 L/s per sq. m) at a static-air-pressure differential of 1.57 lbf/sq. ft. (75 Pa).

E. Water Penetration under Static Pressure: Test according to ASTM E 331 as follows:

1. No evidence of water penetration through fixed glazing and framing areas when tested according to a minimum static-air-pressure differential of 20 percent of positive wind-load design pressure, but not less than 10 lbf/sq. ft. (480 Pa).

F. Energy Performance: Certify and label energy performance according to NFRC as follows:

1. Thermal Transmittance (U-factor): Fixed glazing and framing areas shall have U-factor of not more than 0.45 Btu/sq. ft. x h x deg F (2.55 W/sq. m x K) as determined according to NFRC 100.
2. Solar Heat Gain Coefficient: Fixed glazing and framing areas shall have a solar heat gain coefficient of no greater than 0.35 as determined according to NFRC 200.
3. Condensation Resistance: Fixed glazing and framing areas shall have an NFRC-certified condensation resistance rating of no less than 35 as determined according to NFRC 500.

G. Thermal Movements: Allow for thermal movements resulting from ambient and surface temperature changes:
   1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 MANUFACTURERS

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

1. Arcadia, Inc.
2. Kawneer North America; an Alcoa company.
3. Oldcastle BuildingEnvelope™.
4. Tubelite Inc.

2.3 FRAMING

A. Framing Members: Manufacturer’s extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.
   2. Glazing System: Retained mechanically with gaskets on four sides.
   4. Finish: anodic finish – color as selected by Architect by manufacturer’s full range.
   5. Fabrication Method: Field-fabricated stick system.

B. Backer Plates: Manufacturer’s standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer’s standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:
   1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.
      c. Extruded Structural Pipe and Tubes: ASTM B 429/B 429M.
      d. Structural Profiles: ASTM B 308/B 308M.
2. Steel Reinforcement: Manufacturer’s standard zinc-rich, corrosion-resistant primer complying with SSPC-PS Guide No. 12.00; applied immediately after surface preparation and pretreatment. Select surface preparation methods according to recommendations in SSPC-SP COM, and prepare surfaces according to applicable SSPC standard.
   a. Structural Shapes, Plates, and Bars: ASTM A 36/A 36M.
   b. Cold-Rolled Sheet and Strip: ASTM A 1008/A 1008M.
   c. Hot-Rolled Sheet and Strip: ASTM A 1011/A 1011M.

2.4 ENTRANCE DOOR SYSTEMS
   A. Entrance Doors: Manufacturer’s standard glazed entrance doors for manual-swing operation.
      1. Door Construction: 1-3/4-inch (44.5-mm) overall thickness, with minimum 0.125-inch- (3.2-mm-) thick, extruded-aluminum tubular rail and stile members. Mechanically fasten corners with reinforcing brackets that are deeply penetrated and fillet welded or that incorporate concealed tie rods.
         a. Thermal Construction: High-performance plastic connectors separate aluminum members exposed to the exterior from members exposed to the interior.
   2. Door Design: As indicated.
      a. Provide nonremovable glazing stops on outside of door.

2.5 ENTRANCE DOOR HARDWARE
   A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 08 7100 “Door Hardware.”
   B. General: Provide entrance door hardware for each entrance door to comply with requirements in this Section.
      1. Entrance Door Hardware Sets: Provide quantity, item, size, finish or color indicated.
      2. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.
      3. Opening-Force Requirements:
         a. Egress Doors: Not more than 15 lbf (67 N) to release the latch and not more than 30 lbf (133 N) to set the door in motion and not more than 15 lbf (67 N) to open the door to its minimum required width.
   C. Designations: Requirements for design, grade, function, finish, size, and other distinctive qualities of each type of entrance door hardware are indicated in "Entrance Door Hardware Sets" Article. Products are identified by using entrance door hardware designations as follows:
1. Named Manufacturers' Products: Manufacturer and product designation are listed for each door hardware type required for the purpose of establishing minimum requirements. Manufacturers' names are abbreviated in "Entrance Door Hardware Sets" Article.

2. References to BHMA Standards: Provide products complying with these standards and requirements for description, quality, and function.

D. Pivot Hinges: BHMA A156.4, Grade 1.
E. Butt Hinges: BHMA A156.1, Grade 1, radius corner.
   1. Nonremovable Pins: Provide set screw in hinge barrel that, when tightened into a groove in hinge pin, prevents removal of pin while entrance door is closed.
   2. Exterior Hinges: Stainless steel, with stainless-steel pin.
   3. Quantities:
      a. For doors up to 87 inches (2210 mm) high, provide three hinges per leaf.
F. Mortise Auxiliary Locks: BHMA A156.5, Grade 1.
G. Panic Exit Devices: BHMA A156.3, Grade 1, listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for panic protection, based on testing according to UL 305.
H. Cylinders: As specified in Section 08 7100 "Door Hardware. BHMA A156.5, Grade 1.
   1. Keying: Master key system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE" to be furnished by Owner.
I. Strikes: Provide strike with black-plastic dust box for each latch or lock bolt; fabricated for aluminum framing.
J. Operating Trim: BHMA A156.6.
K. Closers: BHMA A156.4, Grade 1, with accessories required for a complete installation, sized as required by door size, exposure to weather, and anticipated frequency of use; adjustable to comply with field conditions and requirements for opening force.
L. Surface-Mounted Holders: BHMA A156.16, Grade 1.
M. Door Stops: BHMA A156.16, Grade 1, floor or wall mounted, as appropriate for door location indicated, with integral rubber bumper.
N. Weather Stripping: Manufacturer's standard replaceable components.
O. Weather Sweeps: Manufacturer's standard exterior-door bottom sweep with concealed fasteners on mounting strip.
P. Silencers: BHMA A156.16, Grade 1.
Q. Thresholds: BHMA A156.21, raised thresholds beveled with a slope of not more than 1:2, with maximum height of 1/2 inch (12.7 mm).

2.6 GLAZING
A. Glazing: Comply with Section 08 8000 "Glazing."
B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.
C. Glazing Sealants: As recommended by manufacturer.
D. Sealants used inside the weatherproofing system shall have a VOC content of 250 g/L.
E. Sealants used inside the weatherproofing system shall comply with the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."

2.7 FABRICATION
A. Form or extrude aluminum shapes before finishing.
B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.
C. Fabricate components that, when assembled, have the following characteristics:
   1. Profiles that are sharp, straight, and free of defects or deformations.
   2. Accurately fitted joints with ends coped or mitered.
   3. Physical and thermal isolation of glazing from framing members.
   4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
   5. Provisions for field replacement of glazing from interior.
   6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.
D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.
E. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.
F. Entrance Doors: Reinforce doors as required for installing entrance door hardware.
G. Entrance Door Hardware Installation: Factory install entrance door hardware to the greatest extent possible. Cut, drill, and tap for factory-installed entrance door hardware before applying finishes.
H. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.8 ALUMINUM FINISHES
A. Clear Anodic Finish: AAMA 611, AA-M12C22A41, Class I, 0.018 mm or thicker.
B. Color Anodic Finish: AAMA 611, AA-M12C22A42/A44, Class I, 0.018 mm or thicker.
   1. Color: As selected by Architect from full range of industry colors and color densities.
PART 3 - EXECUTION

3.1 INSTALLATION

A. General:
   1. Comply with manufacturer’s written instructions.
   2. Do not install damaged components.
   3. Fit joints to produce hairline joints free of burrs and distortion.
   4. Rigidly secure nonmovement joints.
   5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
   6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:
   1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
   2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 07 9200 “Joint Sealants” to produce weathertight installation.

D. Install components plumb and true in alignment with established lines and grades.

E. Install operable units level and plumb, securely anchored, and without distortion. Adjust weather-stripping contact and hardware movement to produce proper operation.

F. Install glazing as specified in Section 08 8000 “Glazing.”

G. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.
   1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
   2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers’ written instructions using concealed fasteners to greatest extent possible.

3.2 FIELD QUALITY CONTROL

A. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.

   1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.
      a. Perform a minimum of three tests in areas as directed by Architect.
B. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.

C. Prepare test and inspection reports.

END OF SECTION 08 4113
SECTION 08 5313 - VINYL WINDOWS

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes vinyl-framed windows.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Shop Drawings: Include plans, elevations, sections, hardware, accessories, insect screens, operational clearances, and details of installation, including anchor, flashing, and sealant installation.
C. Samples: For each exposed product and for each color specified, 2 by 4 inches (50 by 100 mm) in size.
D. Product Schedule: For vinyl windows. Use same designations indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS
A. Product test reports.
B. Sample warranties.

1.4 WARRANTY
A. Manufacturer's Warranty: Manufacturer agrees to repair or replace vinyl windows that fail in materials or workmanship within specified warranty period.
   1. Warranty Period:
      a. Window: 10 years from date of Substantial Completion.
      b. Glazing Units: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Ply-gen or equal

2.2 WINDOW PERFORMANCE REQUIREMENTS
B. Thermal Transmittance: NFRC 100 maximum whole-window U-factor of \[0.35 \text{ Btu/sq. ft. x h x deg F } (1.71 \text{ W/sq. m x K})\].
C. Solar Heat-Gain Coefficient (SHGC): NFRC 200 maximum whole-window SHGC of \[0.30\].
2.3 VINYL WINDOWS

A. Operating Types: As indicated on Drawings.

   1. Finish: Integral color, “Clay”.
   2. Gypsum Board Returns: Provide at interior face of frame.

C. Glass: Clear annealed glass, ASTM C 1036, Type 1, Class 1, q3.
   1. Kind: Annealed unless Fully tempered where indicated on Drawings.

D. Insulating-Glass Units: ASTM E 2190.
   1. Glass: ASTM C 1036, Type 1, Class 1, q3.
      a. Tint: Clear.
      b. Kind: Fully tempered where indicated on Drawings.
   2. Lites: Two.
   3. Filling: Fill space between glass lites with air.

E. Glazing System: Manufacturer's standard factory-glazing system that produces weathertight seal.

F. Hardware, General: Manufacturer's standard corrosion-resistant material sized to accommodate sash weight and dimensions.
   1. Exposed Hardware Color and Finish: As selected by Architect from manufacturer's full range.

G. Hung Window Hardware:
   2. Locks and Latches: Operated from the inside only.

H. Horizontal-Sliding Window Hardware:
   1. Sill Cap/Track: Designed to comply with performance requirements indicated and to drain to the exterior.
   2. Locks and Latches: Operated from the inside only.
   3. Roller Assemblies: Low-friction design.

I. Weather Stripping: Provide full-perimeter weather stripping for each operable sash unless otherwise indicated.

J. Fasteners: Noncorrosive and compatible with window members, trim, hardware, anchors, and other components.
   1. Exposed Fasteners: Do not use exposed fasteners to the greatest extent possible. For application of hardware, use fasteners that match finish hardware being fastened.
2.4 INSECT SCREENS
   A. General: Fabricate insect screens to fully integrate with window frame. Provide screen for each operable exterior sash. Screen wickets are not permitted.
      1. Type and Location: Half, outside for single-hung; Half, outside for sliding sashes.
   B. Aluminum Frames: Complying with SMA 1004 or SMA 1201.
      1. Finish for Interior Screens: Baked-on organic coating to match window frame or in color selected by Architect from manufacturer's full range.
   C. Glass-Fiber Mesh Fabric: 20-by-30 (0.85-by-0.42-mm) mesh complying with ASTM D 3656.
      1. Mesh Color: black.

2.5 FABRICATION
   A. Fabricate vinyl windows in sizes indicated. Include a complete system for assembling components and anchoring windows.
   B. Glaze vinyl windows in the factory.
   C. Weather strip each operable sash to provide weathertight installation.
   D. Provide mullions and cover plates, compatible with window units, complete with anchors for support to structure and installation of window units. Allow for erection tolerances and provide for movement of window units due to thermal expansion and building deflections. Provide mullions and cover plates capable of withstanding design wind loads of window units. Provide manufacturer's standard finish to match window units.
   E. Mount hardware through double walls of vinyl extrusions or provide corrosion-resistant reinforcement.
   F. Complete fabrication, assembly, finishing, hardware application, and other work in the factory to greatest extent possible. Disassemble components only as necessary for shipment and installation. Allow for scribing, trimming, and fitting at Project site.

PART 3 - EXECUTION

3.1 INSTALLATION
   A. Comply with manufacturer's written instructions for installing windows, hardware, accessories, and other components. For installation procedures and requirements not addressed in manufacturer's written instructions, comply with installation requirements in ASTM E 2112.
   B. Install windows level, plumb, square, true to line, without distortion, anchored securely in place to structural support, and in proper relation to wall flashing and other adjacent construction to produce weathertight construction.
C. Adjust operating sashes and hardware for a tight fit at contact points and weather stripping for smooth operation and weathertight closure.

D. Clean exposed surfaces immediately after installing windows. Remove excess sealants, glazing materials, dirt, and other substances.

E. Remove and replace sashes if glass has been broken, chipped, cracked, abraded, or damaged during construction period.

END OF SECTION 08 5313
SECTION 08 7100 - DOOR HARDWARE

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes:
   1. Mechanical door hardware for the following:
      a. Swinging doors.
      b. Folding doors.
   2. Cylinders for door hardware specified in other Sections.
   3. Electrified door hardware.
B. Products furnished, but not installed, under this Section include the products listed below. Coordinating and scheduling the purchase and delivery of these products remain requirements of this Section.
   1. Pivots, thresholds, weather stripping, and lock cylinders to be installed under other Sections.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product indicated.
B. Shop Drawings: Details of electrified door hardware.
C. Samples: For each exposed product and for each color and texture specified.
D. Other Action Submittals:
   1. Door Hardware Schedule: Prepared by or under the supervision of Installer, detailing fabrication and assembly of door hardware, as well as installation procedures and diagrams. Coordinate final door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of door hardware.
      a. Format: Use same scheduling sequence and format and use same door numbers as in the Contract Documents.
      b. Content: Include the following information:
         1) Identification number, location, hand, fire rating, size, and material of each door and frame.
         2) Locations of each door hardware set, cross-referenced to Drawings on floor plans and to door and frame schedule.
         3) Complete designations, including name and manufacturer, type, style, function, size, quantity, function, and finish of each door hardware product.
         4) Description of electrified door hardware sequences of operation and interfaces with other building control systems.
2. Keying Schedule: Prepared by or under the supervision of Installer, detailing Owner's final keying instructions for locks.

1.3 MAINTENANCE MATERIAL SUBMITTALS
   A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1.4 QUALITY ASSURANCE
   A. Installer Qualifications: Supplier of products and an employer of workers trained and approved by product manufacturers and an Architectural Hardware Consultant who is available during the course of the Work to consult with Contractor, Architect, and Owner about door hardware and keying.
   B. Architectural Hardware Consultant Qualifications: A person who is experienced in providing consulting services for door hardware installations that are comparable in material, design, and extent to that indicated for this Project and who is currently certified by DHI as follows:
   C. Fire-Rated Door Assemblies: Where fire-rated door assemblies are indicated, provide door hardware rated for use in assemblies complying with NFPA 80 that are listed and labeled by a qualified testing agency, for fire-protection ratings indicated, based on testing at positive pressure according to NFPA 252 or UL 10C, unless otherwise indicated.
   D. Smoke- and Draft-Control Door Assemblies: Where smoke- and draft-control door assemblies are required, provide door hardware that meet requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105.
      1. Air Leakage Rate: Maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at the tested pressure differential of 0.3-inch wg (75 Pa) of water.
   E. Electrified Door Hardware: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
   F. Means of Egress Doors: Latches do not require more than 15 lbf (67 N) to release the latch. Locks do not require use of a key, tool, or special knowledge for operation.
   G. Accessibility Requirements: Comply with applicable provisions in the DOJ's 2010 ADA Standards for Accessible Design and ICC A117.1 for door hardware on doors in an accessible route.
      1. Provide operating devices that do not require tight grasping, pinching, or twisting of the wrist and that operate with a force of not more than 5 lbf (22.2 N).
      2. Comply with the following maximum opening-force requirements:
         a. Interior, Non-Fire-Rated Hinged Doors: 5 lbf (22.2 N) applied perpendicular to door.
         b. Sliding or Folding Doors: 5 lbf (22.2 N) applied parallel to door at latch.
         c. Fire Doors: Minimum opening force allowable by authorities having jurisdiction.
      3. Bevel raised thresholds with a slope of not more than 1:2. Provide thresholds not more than 1/2 inch (13 mm) high.
4. Closers: Adjust door and gate closer sweep periods so that, from an open position of 90 degrees, the time required to move the door to a position of 12 degrees from the latch is 5 seconds minimum.

5. Spring Hinges: Adjust door and gate spring hinges so that, from an open position of 70 degrees, the time required to move the door to the closed position is 1.5 seconds minimum.

H. Keying Conference: Conduct conference at Project site to comply with requirements in Section 01 3100 'Project Management and Coordination.'

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.6 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Three (3) years from date of Substantial Completion, unless otherwise indicated.

   a. Electromagnetic and Delayed-Egress Locks: Five (5) years from date of Substantial Completion.
   
   b. Exit Devices: Two (2) years from date of Substantial Completion.
   
   c. Manual Closers: Ten (10) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 SCHEDULED DOOR HARDWARE

A. Provide door hardware for each door as indicated on Drawings to comply with requirements in this Section.

   1. Sequence of Operation: Provide electrified door hardware function, sequence of operation, and interface with other building control systems indicated.

2.2 HINGES

A. Hinges: BHMA A156.1. Provide template-produced hinges for hinges installed on hollow-metal doors and hollow-metal frames; solid and hollow core doors and wood frames.

B. Self Closing Hinges: UL rated, Single Acting Spring Hinges for hinges installed on Hollow Metal doors and Wood frames.

   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
2.3 MECHANICAL LOCKS AND LATCHES

A. Strikes: Provide manufacturer's standard strike for each lock bolt or latchbolt complying with requirements indicated for applicable lock or latch and with strike box and curved lip extended to protect frame; finished to match lock or latch.

1. Flat-Lip Strikes: For locks with three-piece antifriction latchbolts, as recommended by manufacturer.
2. Extra-Long-Lip Strikes: For locks used on frames with applied wood casing trim.
3. Aluminum-Frame Strike Box: Manufacturer's special strike box fabricated for aluminum framing.
4. Rabbet Front and Strike: Provide on locksets for rabbeted meeting stiles.

B. Bored Locks: BHMA A156.2; Grade 2 at residential units, Grade 1 @ Common areas; Series 4000.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
   b. SARGENT Manufacturing Company; ASSA ABLOY.
   c. Schlage; an Ingersoll-Rand brand.
   d. Yale Security Inc; an ASSA ABLOY Group company.

C. Mortise Locks: BHMA A156.13; Operational Grade 2 at residential units, Grade 1 @ Common areas; stamped steel case with steel or brass parts; Series 1000.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
   b. SARGENT Manufacturing Company; ASSA ABLOY.
   c. Schlage; an Ingersoll-Rand brand.
   d. Yale Security Inc; an ASSA ABLOY Group company.

2.4 ELECTROMECHANICAL LOCKS

A. Electromechanical Locks: BHMA A156.25; Grade 1; motor or solenoid driven; bored, mortise deadlocking latchbolt; with strike that suits frame.

   a. SARGENT Manufacturing Company; ASSA ABLOY.
   b. Schlage; an Ingersoll-Rand brand.
2.5 LOCK CYLINDERS
   A. Lock Cylinders: Tumbler type, constructed from brass or bronze, stainless steel, or nickel silver.
      1. Manufacturer: Same manufacturer as for locking devices.
   B. Construction Master Keys: Provide cylinders with feature that permits voiding of construction keys without cylinder removal. Provide 10 construction master keys.

2.6 KEYING
      1. Master Key System: Change keys and a master key operate cylinders.
   B. Keys: Nickel silver.
      1. Stamping: Permanently inscribe each key with a visual key control number and include the following notation:
         a. Notation: Information to be furnished by Owner.
      2. Quantity: In addition to one extra key blank for each lock, provide the following:
         b. Master Keys: Five.

2.7 KEY CONTROL SYSTEM
   A. Key Control Cabinet: BHMA A156.5; metal cabinet with baked-enamel finish; containing key-holding hooks, labels, 2 sets of key tags with self-locking key holders, key-gathering envelopes, and temporary and permanent markers; with key capacity of 150 percent of the number of locks.
      1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
         a. American Key Boxes and Cabinets.
         b. GE Security, Inc.
      2. Wall-Mounted Cabinet: Cabinet with hinged-panel door equipped with key-holding panels and pin-tumbler cylinder door lock.

2.8 OPERATING TRIM
   A. Operating Trim: BHMA A156.6; stainless steel, unless otherwise indicated.
2.9 SURFACE CLOSERS
A. Surface Closers: BHMA A156.4; rack-and-pinion hydraulic type with adjustable sweep and latch speeds controlled by key-operated valves and forged-steel main arm. Comply with manufacturer's written recommendations for size of door closers depending on size of door, exposure to weather, and anticipated frequency of use. Provide factory-sized closers, adjustable to meet field conditions and requirements for opening force.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. Corbin Russwin, Inc.; an ASSA ABLOY Group company.
   b. Norton Door Controls; an ASSA ABLOY Group company.
   c. Yale Security Inc; an ASSA ABLOY Group company.

2.10 MECHANICAL STOPS AND HOLDERS
A. Wall- and Floor-Mounted Stops: BHMA A156.16; cast brass, stainless steel or aluminum base metal.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. Baldwin Hardware Corporation.
   b. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.11 DOOR GASKETING
A. Door Gasketing: BHMA A156.22; air leakage not to exceed 0.50 cfm per foot (0.000774 cu. m/s per m) of crack length for gasketing other than for smoke control, as tested according to ASTM E 283; with resilient or flexible seal strips that are easily replaceable and readily available from stocks maintained by manufacturer.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. Hager Companies.
   b. Pemko Manufacturing Co.

2.12 THRESHOLDS
A. Thresholds: BHMA A156.21; fabricated to full width of opening indicated.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. Hager Companies.
   b. Pemko Manufacturing Co.
2.13 FOLDING DOOR HARDWARE
   A. General: BHMA A156.14; complete sets including overhead rails, hangers, supports, bumpers, floor guides, and accessories indicated.
      1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
         a. Stanley Commercial Hardware; a division of Stanley Security Solutions.

2.14 METAL PROTECTIVE TRIM UNITS
   A. Metal Protective Trim Units: BHMA A156.6; fabricated from 0.050-inch (1.3-mm-) thick stainless steel; with manufacturer's standard machine or self-tapping screw fasteners.
      1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
         a. Baldwin Hardware Corporation.
         b. Trimco.

2.15 AUXILIARY ELECTRIFIED DOOR HARDWARE
   A. Auxiliary Electrified Door Hardware:
      1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
         a. SARGENT Manufacturing Company; ASSA ABLOY.
         b. Schlage; an Ingersoll-Rand brand.

2.16 FABRICATION
   A. Fasteners: Provide door hardware manufactured to comply with published templates prepared for machine, wood, and sheet metal screws. Provide screws that comply with commercially recognized industry standards for application intended, except aluminum fasteners are not permitted. Provide Phillips flat-head screws with finished heads to match surface of door hardware, unless otherwise indicated.
      1. Concealed Fasteners: For door hardware units that are exposed when door is closed, except for units already specified with concealed fasteners. Do not use through bolts for installation where bolt head or nut on opposite face is exposed unless it is the only means of securely attaching the door hardware. Where through bolts are used on hollow door and frame construction, provide sleeves for each through bolt.
      2. Fire-Rated Applications:
         a. Wood or Machine Screws: For the following:
            1) Hinges mortised to doors or frames; use threaded-to-the-head wood screws for wood doors and frames.
2) Strike plates to frames.
3) Closers to doors and frames.

b. Steel Through Bolts: For the following unless door blocking is provided:
   1) Surface hinges to doors.
   2) Closers to doors and frames.
   3) Surface-mounted exit devices.

3) Spacers or Sex Bolts: For through bolting of hollow-metal doors.

4. Fasteners for Wood Doors: Comply with requirements in DHI WDHS.2, "Recommended Fasteners for Wood Doors."

5. Gasketing Fasteners: Provide noncorrosive fasteners for exterior applications and elsewhere as indicated.

2.17 FINISHES
A. Provide finishes complying with BHMA A156.18 as indicated in door hardware schedule.
B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

PART 3 - EXECUTION

3.1 INSTALLATION
A. Steel Doors and Frames: For surface applied door hardware, drill and tap doors and frames according to ANSI/SDI A250.6.
B. Wood Doors: Comply with DHI WDHS.5 "Recommended Hardware Reinforcement Locations for Mineral Core Wood Flush Doors."
C. Mounting Heights: Mount door hardware units at heights indicated on Drawings unless otherwise indicated or required to comply with governing regulations.
   2. Custom Steel Doors and Frames: HMMA 831.
D. Install each door hardware item to comply with manufacturer's written instructions. Where cutting and fitting are required to install door hardware onto or into surfaces that are later to be painted or finished in another way, coordinate removal, storage, and reinstallation of surface protective trim units with finishing work. Do not install surface-mounted items until finishes have been completed on substrates involved.
   1. Set units level, plumb, and true to line and location. Adjust and reinforce attachment substrates as necessary for proper installation and operation.
2. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

E. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than the number recommended by manufacturer for application indicated or one hinge for every 30 inches (750 mm) of door height, whichever is more stringent, unless other equivalent means of support for door, such as spring hinges or pivots, are provided.

F. Lock Cylinders: Install construction cores to secure building and areas during construction period.
   1. Replace construction cores with permanent cores as directed by Owner.
   2. Furnish permanent cores to Owner for installation.

G. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

H. Boxed Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings. Verify location with Architect.
   1. Configuration: Provide one power supply for each door opening with electrified door hardware.

I. Thresholds: Set thresholds for exterior doors and other doors indicated in full bed of sealant complying with requirements specified in Section 07 9200 "Joint Sealants."

J. Stops: Provide wall stops for doors unless indicated otherwise on the drawings. Do not stops where they will impede traffic.

K. Perimeter Gasketing: Apply to head and jamb, forming seal between door and frame.

L. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

M. Door Bottoms: Apply to bottom of door, forming seal with threshold when door is closed.

N. Adjustment: Adjust and check each operating item of door hardware and each door to ensure proper operation or function of every unit. Replace units that cannot be adjusted to operate as intended. Adjust door control devices to compensate for final operation of heating and ventilating equipment and to comply with referenced accessibility requirements.

END OF SECTION 08 7100
SECTION 08 8000 - GLAZING

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes:
      1. Glass for windows, doors, storefront framing.
      2. Glazing sealants and accessories.

1.2 COORDINATION
   A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. LEED Submittals:
      1. Product Data for field-applied glazing sealants, documentation including printed statement of VOC content.
      2. Laboratory Test Reports for glazing sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health’s (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
   C. Glass Samples: For each type of glass product other than clear monolithic vision glass; 12 inches (300 mm) square.
   D. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.4 INFORMATIONAL SUBMITTALS
   A. Preconstruction adhesion and compatibility test report.

1.5 QUALITY ASSURANCE
   A. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

1.6 PRECONSTRUCTION TESTING
   A. Preconstruction Adhesion and Compatibility Testing: Test each glass product, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
1. Testing is not required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.

1.7 WARRANTY

A. Manufacturer’s Special Warranty for Coated-Glass Products: Manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer’s written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.

1. Warranty Period: [10] years from date of Substantial Completion.

B. Manufacturer’s Special Warranty for Insulating Glass: Manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer’s written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1. Warranty Period: [10] years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   b. Pilkington North America.
   c. PPG Industries, Inc.

2.2 PERFORMANCE REQUIREMENTS

A. Structural Performance: Glazing shall withstand the following design loads within limits and under conditions indicated determined according to the International Building Code and ASTM E 1300.

1. Design Wind Pressures: As indicated on Drawings.

2. Differential Shading: Design glass to resist thermal stresses induced by differential shading within individual glass lites.

B. Safety Glazing: Where safety glazing is indicated, provide glazing that complies with 16 CFR 1201, Category II.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer’s published test data, based on procedures indicated below:
1. **U-Factors:** Center-of-glazing values, according to NFRC 100 and based on LBL's WINDOW 5.2 computer program, expressed as Btu/sq. ft. x h x deg F (W/sq. m x K).

2. **Solar Heat-Gain Coefficient and Visible Transmittance:** Center-of-glazing values, according to NFRC 200 and based on LBL's WINDOW 5.2 computer program.

3. **Visible Reflectance:** Center-of-glazing values, according to NFRC 300.

### 2.3 GLASS PRODUCTS, GENERAL

**A. Glazing Publications:** Comply with published recommendations of glass product manufacturers and organizations below unless more stringent requirements are indicated. See these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: "Glazing Manual."

**B. Safety Glazing Labeling:** Where safety glazing is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or manufacturer. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

**C. Insulating-Glass Certification Program:** Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

**D. Thickness:** Where glass thickness is indicated, it is a minimum. Provide glass that complies with performance requirements and is not less than the thickness indicated.

**E. Strength:** Where fully tempered float glass is indicated, provide fully tempered float glass.

### 2.4 GLASS PRODUCTS

**A. Clear Annealed Float Glass:** ASTM C 1036, Type I, Class 1 (clear), Quality-Q3.

**B. Ultraclear Float Glass:** ASTM C 1036, Type I, Class I (clear), Quality-Q3; and with visible light transmission of not less than 91 percent and solar heat gain coefficient of not more than .32

**C. Fully Tempered Float Glass:** ASTM C 1048, Kind FT (fully tempered), Condition A (uncoated) unless otherwise indicated, Type I, Class 1 (clear)

**D. Pyrolytic-Coated, Low-Maintenance Glass:** Clear float glass with a coating on first surface having both photocatalytic and hydrophilic properties that act to loosen dirt and to cause water to sheet evenly over the glass instead of beading.

**E. Ceramic-Coated Vision Glass:** ASTM C 1048, Condition C, Type I, Class 1 (clear) and complying with Specification No. 95-1-31 in GANA's "Engineering Standards Manual."

### 2.5 INSULATING GLASS

**A. Insulating-Glass Units:** Factory-assembled units consisting of sealed lites of glass separated by a dehydrated interspace, qualified according to ASTM E 2190.
2. Spacer: Thermally broken aluminum or Nonmetallic laminate

2.6 GLAZING SEALANTS

A. General:
1. Compatibility: Compatible with one another and with other materials they contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
2. Suitability: Comply with sealant and glass manufacturers’ written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
3. Field-applied sealants shall have a VOC content of not more than 250 g/L.
4. Sealants shall comply with the testing and product requirements of the California Department of Public Health’s (formerly, the California Department of Health Services’) “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.”
5. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
C. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 50, Use NT.
D. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.
E. Glazing Sealant: Acid-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 25, Use NT.

2.7 GLAZING TAPES

A. Back-Bedding Mastic Glazing Tapes: Preformed, butyl-based, 100 percent solids elastomeric tape; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; and complying with ASTM C 1281 and AAMA 800 for products indicated below:
1. AAMA 804.3 tape, where indicated.
2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.

B. Expanded Cellular Glazing Tapes: Closed-cell, PVC foam tapes; factory coated with adhesive on both surfaces; and complying with AAMA 800 for the following types:
1. AAMA 810.1, Type 1, for glazing applications in which tape acts as the primary sealant.

2. AAMA 810.1, Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.8 MISCELLANEOUS GLAZING MATERIALS

A. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

B. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

C. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

D. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

E. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

PART 3 - EXECUTION

3.1 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass includes glass with edge damage or other imperfections that, when installed, could weaken glass, impair performance, or impair appearance.

C. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

D. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

F. Provide spacers for glass lites where length plus width is larger than 50 inches (1270 mm).

G. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
3.2 TAPE GLAZING
A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
C. Cover vertical framing joints by applying tapes to heads and sills first, then to jambs. Cover horizontal framing joints by applying tapes to jambs, then to heads and sills.
D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
E. Apply heel bead of elastomeric sealant.
F. Center glass lites in openings on setting blocks, and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
G. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.3 GASKET GLAZING (DRY)
A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.
B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks, and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
E. Install gaskets so they protrude past face of glazing stops.

3.4 SEALANT GLAZING (WET)
A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.
B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
3.5 CLEANING AND PROTECTION

A. Immediately after installation remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains.
   1. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer. Remove and replace glass that cannot be cleaned without damage to coatings.

C. Remove and replace glass that is damaged during construction period.

3.6 INSULATING GLASS SCHEDULE

A. Glass Type: Low-E-coated, clear insulating glass.
   1. Overall Unit Thickness: 1 inch (25 mm).
   2. Minimum Thickness of Each Glass Lite: 3/16”
   3. Outdoor Lite: Annealed float glass.
   4. Interspace Content: Air.
   5. Indoor Lite: Annealed float glass.
   6. Low-E Coating: Pyrolytic coating to achieve the following minimums:
   7. U-Factor: 0.32 maximum.
   8. Visible Light Transmittance: 90% percent minimum.
   9. Solar Heat Gain Coefficient: 0.32 maximum.
   10. Tempered glazing required at locations defined by code and indicated on drawings.

END OF SECTION 08 8000
SECTION 08 8300 - MIRRORS

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes the following types of silvered flat glass mirrors:
   1. Annealed monolithic glass mirrors.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. LEED Submittals:
C. Shop Drawings: Include mirror elevations, edge details, mirror hardware, and attachment details.
D. Samples: For each type of the following:
   1. Mirrors: 12 inches (300 mm) square, including edge treatment on two adjoining edges.
   3. Mirror Trim: 12 inches (300 mm) long.

1.3 INFORMATIONAL SUBMITTALS
A. Preconstruction test report.
B. Sample Warranty: For special warranty.

1.4 CLOSEOUT SUBMITTALS
A. Maintenance Data: For mirrors to include in maintenance manuals.

1.5 WARRANTY
A. Special Warranty: Manufacturer agrees to replace mirrors that deteriorate within specified warranty period. Deterioration of mirrors is defined as defects developed from normal use that are not attributed to mirror breakage or to maintaining and cleaning mirrors contrary to manufacturer's written instructions. Defects include discoloration, black spots, and clouding of the silver film.
   1. Warranty Period: 5 years from date of Substantial Completion.
PART 2 - PRODUCTS

2.1 SILVERED FLAT GLASS MIRRORS
   A. Mirrors, General: ASTM C 1503; manufactured using copper-free, low-lead mirror coating process.
   B. Annealed Monolithic Glass Mirrors: Mirror Glazing Quality, clear (low-iron) float glass with a minimum 91 percent visible light transmission.
      1. Nominal Thickness: 5.0 mm.

2.2 MISCELLANEOUS MATERIALS
   A. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.
   B. Edge Sealer: Coating approved by mirror manufacturer.

2.3 MIRROR HARDWARE
   A. Mirror Bottom Clips: Satin stainless steel, No. 4 finish.
   B. Mirror Top Clips: Satin stainless steel, No. 4 finish.
   C. Fasteners: Fabricated of same basic metal and alloy as fastener metal and matching it in finished color and texture where fasteners are exposed.

2.4 FABRICATION
   A. Fabricate cutouts for notches and holes in mirrors without marring visible surfaces. Locate and size cutouts so they fit closely around penetrations in mirrors.
   B. Mirror Edge Treatment: Flat high-polished. Seal edges of mirrors with edge sealer.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine substrates, over which mirrors are to be mounted, with Installer present, for compliance with installation tolerances, substrate preparation, and other conditions affecting performance of the Work.
   B. Proceed with installation only after unsatisfactory conditions have been corrected and surfaces are dry.
3.2 PREPARATION

3.3 INSTALLATION

A. General: Install mirrors to comply with mirror manufacturer's written instructions and with referenced GANA publications. Mount mirrors accurately in place in a manner that avoids distorting reflected images.

B. Install mirrors with mirror hardware. Attach mirror hardware securely to mounting surfaces with mechanical fasteners installed with anchors or inserts as applicable. Install fasteners so heads do not impose point loads on backs of mirrors.

C. Clean exposed surface of mirrors not more than four days before date scheduled for inspections that establish date of Substantial Completion. Clean mirrors as recommended in writing by mirror manufacturer.

END OF SECTION 08 8300
SECTION 08 8813 - FIRE-RESISTANT GLAZING

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Fire-resistance insulated glazing.

1.2 COORDINATION
   A. Coordinate glazing channel dimensions to provide necessary bite on glass, minimum edge
      and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

1.3 RELATED SECTIONS:
   1. Section 08 5123 “Steel Windows”.

1.4 PERFORMANCE REQUIREMENTS
   A. Fire-rated glass ceramic clear and wireless glazing material listed for use in non-impact
      safety-rated locations such as transoms and borrowed lites with fire rating requirements
      ranging from 20 to 180 minutes with required hose stream test.
   B. Passes positive pressure test standards UBC 7-2 and UBC 7-4.
   C. Provide insulated glazing system that is produced, fabricated, and installed to withstand
      normal thermal movement, wind loading, and impact loading without failure, including loss
      or glass breakage attributable to the following:
   D. 1. Defective manufacture, fabrication, and installation.
   E. 2. Failure of sealants or gaskets to remain watertight and airtight.
   F. 3. Deterioration of glazing materials.
   G. 4. Other defects in construction.
   H. Glass Design: Provide insulated glass lites for the various size openings in thicknesses and
      strengths to meet or exceed the following criteria:
   I. 1. Minimum glass thickness of lites in exterior walls: Nominal [3/16 inch][5.0 mm].
   J. 2. Tinted and heat-absorbing glass thickness for each tint: Same throughout Project.
   K. 3. Size glass to withstand positive and negative loads acting on glazing systems, with edge
      clearances and tolerances complying with recommendations of glass manufacturer.
   L. Thermal Movement: Design temperature change (range) or 120 degrees F [67 degrees C]
      ambient, and 180 degrees F [100 degrees C] material surface.
1.5 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Certificates of compliance from glass and glazing materials manufacturers attesting that glass and glazing materials furnished for project comply with requirements. Separate certification will not be required for glazing materials bearing manufacturer’s permanent label designating type and thickness of glass, provided labels represent a quality control program involving a recognized certification agency or independent testing laboratory acceptable to authority having jurisdiction.
   C. Product Test Listings: From UL indicating fire-rated glass complies with requirements, based on comprehensive testing of current product.
   D. F. Insulating Glass Certification Program: Provide insulating glass units complying with requirements indicated which are permanently marked with certification label of the following inspecting and testing agency:
      1. Insulating Glass Certification Council.
      2. Associated Laboratories, Inc.
   G. LEED Submittals:
      1. Product Data for glazing sealants, documentation including printed statement of VOC content.
      2. Laboratory Test Reports for glazing sealants, documentation indicating that products comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Small-Scale Environmental Chambers."
   H. Glass Samples: For each type of glass product; 12 inches (300 mm) square.
   I. Glazing Schedule: List glass types and thicknesses for each size opening and location. Use same designations indicated on Drawings.

1.6 WARRANTY
   A. Manufacturer’s Special Warranty on Laminated Glass: Manufacturer agrees to replace glass units that deteriorate within specified warranty period. Deterioration of glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning glass contrary to manufacturer's written instructions. Defects include, but are not limited to edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced glass standard.
      1. Warranty Period: 10 years from date of Substantial Completion.
PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL
A. Glazing Publications: Comply with published recommendations of glass product manufacturers and organization below unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
B. Safety Glazing Labeling: Permanently mark glazing with certification label of the the Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction or the manufacturer. Label shall indicate manufacturer's name, type of glass, glass thickness, and safety glazing standard with which glass complies.

2.2 FIRE-RATED INSULATED GLASS UNITS
A. A. Supplier: FireLite® IGU as supplied by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, Washington 98065, voice 1-800-426-0279, fax 1-800-451-9857, e-mail sales@fireglass.com, web site www.fireglass.com.
B. Primary Glass Products (AG - Annealed Glass): ASTM C 1036, Type I (transparent, flat), [1/4 inch] [6 mm] thick float glass unless otherwise indicated:
C. 1. Clear Float: Class 1 (clear), Quality q3 (glazing select).
D. Heat-Treated Safety Glass: ASTM C 1048:
   1. TG - Tempered Glass, Clear: Kind FT, Condition A, Type I, Class and Quality as specified for primary clear float glass.
E. Sealed Insulating Glass Units: ASTM E 774, Class A.
F. 1. Nominal Thickness: [1 inch] [25.4 mm]
G. 2. Glass - Vision Units: Two lites, one fire-rated and one tempered safety or annealed glass, as scheduled:
I. b. Interior Lite: Clear FireLite® with Standard surface finish.
J. c. Performance: 88 percent visible light transmittance and 9 percent visible light reflectance; U-value of .30; and solar heat gain coefficient of .30.
K. 3. Air Space Width: Nominal 1/2 inch measured perpendicularly from surfaces of glass lites at unit's edge.
L. 4. Sealing System: Dual seal, polyisobutylene primary seal, polysulfide secondary seal, 10 year limited warranty.
M. 5. Spacer Specifications: Manufacturer's standard stainless steel.
N. a. Desiccant: Manufacturer's standard desiccant.
O. Corner Construction: Manufacturer's standard corner construction.
2.3 Fire-Rated Glazing Materials

A. Manufacturer: FireLite® as manufactured by Nippon Electric Glass Company, Ltd., and distributed by Technical Glass Products, 8107 Bracken Place SE, Snoqualmie, WA 98065, voice 1-800-426-0279, fax 1-800-451-9857, e-mail sales@fireglass.com, web site www.fireglass.com.

B. Properties:
   1. Thickness: 3/16 inch [5 mm].
   2. Weight: 2.4 lbs./sq. ft.
   5. Hardness (Vicker’s Scale): 700.
   6. Fire-rating: 20 minutes to 90 minutes.
   8. Positive Pressure Test: UL 10C, UBC 7-2 and 7-4; passes.
   9. Surface Finish:
      a. Premium Grade-Ground and polished on both sides
      b. Standard Grade-Comparable to alternative fire-rated products marketed as “Premium”
      c. Obscure-Patterned surface
      d. Positive Pressure Test: UL 10C, UBC 7-2 and 7-4; passes.

C. Maximum sheet sizes based on surface finish:

D. Labeling: Permanently label each piece of FireLite® with the FireLite® logo, UL logo and fire rating in sizes up to 3,325 sq. in., and with the FireLite® label only for sizes that exceed the listing (as approved by the local authority having jurisdiction).

E. Fire Rating: Fire rating listed and labeled by UL for fire rating scheduled at opening locations on drawings, when tested in accordance with [ASTM E2074-00 and ASTM E2010-01] [ULC Standards CAN4 S-104 and CAN4 S-106] [NFPA 257] [UL 9 and UL 10B].

F. Substitutions: No substitutions permitted.

2.4 GLAZING COMPOUND FOR FIRE-RATED GLAZING MATERIALS

A. Glazing Tape: Closed cell polyvinyl chloride (PVC) foam, coiled on release paper over adhesive on two sides, maximum water absorption by volume of 2 percent. Glass panels that exceed 1,393 sq. inches for 90-minute ratings must be glazed with fire-rated glazing tape supplied by manufacturer.

B. [Glazing Compound: DAP 33 putty.]

C. Polysulfide Sealant.
D. Setting Blocks: Neoprene, EPDM, or silicone; tested for compatibility with glazing compound; of 70 to 90 Shore A hardness.

E. Cleaners, Primers, and Sealers: Type recommended by manufacturer of glass and gaskets.

2.5 FABRICATION

A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with recommendations of product manufacturer and referenced glazing standard as required to comply with system performance requirements.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine glass framing, with glazier present, for compliance with the following:
   1. Manufacturing and installation tolerances, including those for size, squareness, offsets at corners.
   2. Minimum required face or edge clearances.
   3. Observable edge damage or face imperfections.

B. Do not proceed with glazing until unsatisfactory conditions have been corrected.

C. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings that are not firmly bonded to substrates.

3.2 INSTALLATION – INSULATED GLASS UNITS

A. Comply with referenced FGMA standards and instructions of manufacturers of glass, glazing sealants, and glazing compounds.

B. Protect glass from edge damage during handling and installation. Inspect glass during installation and discard pieces with edge damage that could affect glass performance.

C. Crimp and seal breather tubes.

D. Set units of glass in each series with uniformity of pattern, draw, bow, and similar characteristics.

E. Cut glazing tape to length and set against permanent stops, flush with sight lines to fit openings exactly, with stretch allowance during installation.

F. Place setting blocks located at quarter points of glass with edge block no more than 6 inches from corners.

G. Glaze vertically into labeled fire-rated metal frames with same fire rating as glass and push against tape for full contact at perimeter of pane or unit.

H. Place glazing tape on free perimeter of glazing in same manner described above.

I. Install removable stop and secure without displacement of tape.
J. [Use specified glazing compound, without adulteration; bed glazing material in glazing compound; entirely fill all recess and spaces. Provide visible glazing compound with smooth and straight edges.]

K. Install in vision panels in fire-rated doors to requirements of NFPA 80.

L. Install so that appropriate [UL] [FireLite® IGU] markings remain permanently visible.

### 3.3 PROTECTION AND CLEANING

A. Protect glass from contact with contaminating substances resulting from construction operations. Remove any such substances by method approved by glass manufacturer.

B. Wash glass on both faces not more than four days prior to date scheduled for inspections intended to establish date of substantial completion. Wash glass by method recommended by glass manufacturer.

### 3.4 FIRE-RESISTANCE-RATED GLAZING SCHEDULE

<table>
<thead>
<tr>
<th>Rating</th>
<th>Assembly</th>
<th>Max. Exposed Area (Sq. In.)</th>
<th>Max. Width OF Exposed Glazing (In.)</th>
<th>Max. Height OF Exposed Glazing (In.)</th>
<th>Stop Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 min.</td>
<td>Other than doors</td>
<td>3,325</td>
<td>95</td>
<td>95</td>
<td>5/8”</td>
</tr>
<tr>
<td></td>
<td>HMS or wood</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fireframes D.S.</td>
<td>3,325</td>
<td>95</td>
<td>95</td>
<td>3/4”</td>
</tr>
</tbody>
</table>

A. HMS indicates hollow metal steel framing. Fireframes® D.S. indicates Designer Series narrow profile framing available from TGP. For wood frames, check with manufacturer for maximum tested glass sizes.

**END OF SECTION 08 8813**
SECTION 09 2400 - CEMENT PLASTERING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes: Supply and installation of fiber reinforced, one-coat stucco assembly with fiberglass mesh for crack resistance with an cement based stucco finish
   1. Exterior vertical plasterwork (stucco).
   2. Exterior horizontal and nonvertical plasterwork (stucco).

1.2 REFERENCES

   A. ASTM C144 Standard Specification for Aggregate for Masonry Mortar
   B. ASTM C578 Specification for Preformed, Cellular Polystyrene Thermal Insulation
   C. ASTM C847 Standard Specification for Metal Lath
   E. ASTM C926 Standard Specification for Application of Portland Cement-Based Plaster
   G. ASTM C1032 Standard Specification for Woven Wire Plaster Base
   H. ASTM C1063 Standard Specification for Installation of Lathing and Furring for Portland Cement Based Plaster
   I. ASTM C1177 Specification for Glass Mat Gypsum for Use as Sheathing
   J. ASTM C1278 Specification for Fiber-Reinforced Gypsum Panel
   K. ASTM C1396 Standard Specification for Gypsum Board
   L. ASTM E84 Test Method for Surface Burning Characteristics of Building Materials
   M. ASTM E119 Method for Fire Tests of Building Construction and Materials
   N. ASTM E330 Test Method for Structural Performance of Windows, Curtain Walls, and Doors by Uniform Static air Pressure Difference
   P. ICC Acceptance Criteria 212 Acceptance Criteria For Water-Resistive Coatings Used As Water-Resistive Barriers Over Exterior Sheathing
1.3 ASSEMBLY DESCRIPTION
A. One-Coat Stucco Assembly with a metal lathing, a factory formulated stucco basecoat, a fiberglass reinforcing mesh embedded into the basecoat, and a cement based finish coats.

1.4 ACTION SUBMITTALS
A. General: Submit samples, water resistive barrier coating Evaluation Reports and manufacturer’s product data sheets in accordance with Division 1 General Requirements Submittal Section.
B. Samples: Submit samples for approval. Samples shall be of materials specified and of suitable size as required to accurately represent each color and texture used on project. Prepare each sample using same tools and techniques for actual project application. Maintain and make available, at job site, approved samples.
C. Manufacturer’s Warranty: Submit sample copies of Manufacturer’s Warranty indicating Single Source Responsibility for Water Resistive Barrier coating, Stucco Base coat, finish coat and optional Primer, level coat and reinforcing mesh as specified.

1.5 QUALITY ASSURANCE
A. Qualifications:
1. Manufacturer: Shall have marketed stucco assemblies in United States for at least ten years and shall have completed projects of same general scope and complexity.
2. Applicator: Shall be experienced and competent in installation of stucco materials and liquid-applied membranes, and shall provide evidence of a minimum of five years’ experience in work similar to that required by this section.

B. Stucco Assembly Functional Criteria:
1. General: Stucco application shall be to vertical substrates or to substrates sloped for positive drainage. Substrates sloped for drainage shall have additional protection from weather exposure that might be harmful to coating performance.

C. Substrate Conditions:
1. Substrate materials and construction shall conform to the building code having jurisdiction.
2. Substrates shall be sound, dry and free of dust, dirt, laitance, efflorescence and other harmful contaminants.
3. Substrate Dimensional Tolerances: Flat with 1/4 in (6.4 mm) within any 10 ft (3 m) radius.
4. Maximum deflection of substrate system under positive or negative design loads shall not exceed L/360 of span.

D. Expansion and Control Joints: Continuous expansion and control joints shall be installed at locations in accordance with ASTM C1063 and ASTM C926.
1. Substrate movement, and expansion and contraction of Stucco Assembly and adjacent materials shall be taken into account in design of expansion joints, with proper consideration given to sealant properties, installation conditions, temperature range, coefficients of expansion of materials, joint width to depth ratios, and other material factors. Minimum width of expansion joints shall be as specified by the designer or shown on the project drawings.

2. In accordance with ASTM C1063, expansion or control joints shall be installed in walls not more than 144 ft² (13.4 m²) in area, and not more than 100 ft² (9.3 m²) in area for all non-vertical applications. The distance between joints shall not exceed 18 ft (5.5 m) in either direction or a length-to-width ratio of 2-1/2 to 1.

3. For direct application to concrete or masonry, stucco joints are required only at control/expansion joints in the underlying concrete or masonry.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver Stucco Assembly products in original packaging with manufacturer's identification.

B. Storage: Store Stucco Assembly products in a dry location, out of direct sunlight, off the ground, and protected from moisture.

1.7 SITE/ENVIRONMENTAL CONDITIONS

A. Substrate Temperature: Do not apply stucco assembly products to substrates whose temperature are below 40°F (4°C) or contain frost or ice.

B. Inclement Weather: Do not apply stucco base during inclement weather, unless appropriate protection is employed.

C. Sunlight Exposure: Avoid, when possible, installation of the stucco assembly in direct sunlight. Application of finishes in direct sunlight in hot weather may adversely affect aesthetics.

D. Do not apply stucco base coats or finishes if ambient temperature falls below 40°F (4°C) within 24 hours of application. Protect stucco from uneven and excessive evaporation during dry weather and strong blasts of dry air.

E. Prior to installation, the wall shall be inspected for surface contamination, or other conditions that may adversely affect the performance of the stucco assembly and shall be free of residual moisture.

1.8 COORDINATION AND SCHEDULING

A. Coordination: Coordinate stucco assembly installation with other construction operations.
1.9 WARRANTY

1.10 Warranty: Upon request, at completion of installation, provide manufacturer’s Standard Limited Stucco Warranty

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturer, Basis of Design: Parex USA, Inc., brands include: El Rey Stucco, Lahabra Stucco 4125 E. La Palma Ave., Suite 250, Anaheim, CA 92807 Contact: Architectural Sales, Andy Townes at (866.516.0061) or andy.townes@parexusa.com or Technical Support (800.226.2424).

B. Components: Obtain components manufactured by Parex USA Stucco Assembly from authorized distributors. No substitutions or additions of other materials are permitted without prior written permission from Architect or owner for this project.

2.2 MATERIALS

A. Water-Resistive Barrier over Sheathing: 2 layers of a grade D paper minimum.

B. Stucco Base Coat (3/8 in – 1/2 in)
   1. Fastwall Stucco Base™ Concentrate: Proprietary mixture of Portland cement and proprietary ingredients mixed with clean, cool, potable water, and ASTM C897 or ASTM C144 sand added.

C. Reinforcing Coat (used with Crack Resistant Assembly embedment into basecoat)
   1. Reinforcing Meshes:
      a. Krak-Master: Weight 4.5 oz. per sq. yd (153 g/m2) reinforcing mesh.

D. Finish:

2.3 RELATED MATERIALS AND ACCESSORIES

A. General: Stucco assembly and its related materials shall conform to the requirements of ICC-ES Evaluation Report No. 2564 and shall conform to this specification.

B. Substrate Materials:
   1. Gypsum Sheathing: Minimum 1/2 in (13 mm) thick, core-treated, weather-resistant, exterior gypsum sheathing complying with ASTM C79 or ASTM C1177.

   2. Plywood: Minimum 5/16 in (8 mm) thick exterior grade or Exposure I plywood for studs spaced 16 in (406 mm) o.c. and 3/8 in (9 mm) thick exterior type plywood
minimum for studs spaced 24 in (610 mm) o.c. Plywood shall comply be exterior grade or Exposure 1 and comply with DOC PS-1

3. Oriented Strand Board (OSB): 7/16 – 1/2 in Wall-16 or Wall-24, approved by the APA, TECO, or PSI/PTL. Stamped as Exposure 1 or Exterior Sheathing with a PS2 or PRP-108 rating. The system is qualified for application to OSB (oriented strand board) sheathing only in areas shown in the manufacturer’s Acceptable Substrates and Areas of Use Technical Bulletin.

4. Concrete Masonry Construction: Painted (coated) and non-painted (uncoated) must conform with the building code.

5. Other Approved by stucco manufacturer in writing prior to the project.

C. Water-Resistant Barriers:
   1. Plywood and OSB Sheathing
      a. Minimum 2 coats of Parex WeatherSeal Spray & Roll-On covered by a water vapor permeable intervening material such as building wrap.

D. Lath and Accessories: Conform to ASTM C847, ASTM C933, ASTM C1032, ASTM C1063 and Appendix
   1. Accessories: Manufacturer’s standard steel products with minimum G60 galvanizing. Includes plaster stops, control joints, weep screeds, etc.
   2. Metal Plaster Bases: Minimum 2.5 lb/yd2 (1.4 kg/m2) or 3.4 lb/yd2 (1.8 kg/m2) expanded metal diamond lath, or welded wire lath in accordance with applicable codes and standards.
   3. Weep Screeds: Foundation weep screed with minimum 3-1/2 inch vertical attachment flange.

E. Seals, Sealants and Bond Breakers: Sealants shall conform to ASTM C920, Grade NS, Class 25, Use NT. Backer rod shall be closed-cell polyethylene foam.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Verify project site conditions under provisions of Section 01 00 00.
   B. Compliance: Comply with manufacturer’s instructions for installation of the stucco assembly.
   C. Substrate Examination: Examine prior to stucco base installation as follows:
      1. Substrate shall be of a type approved by stucco manufacturer. Plywood and OSB substrates shall be gapped 1/8 in (3.2 mm) at all edges.
      2. Substrate shall be examined for soundness, and other harmful conditions.
      3. Substrate shall be free of dust, dirt, laitance, efflorescence, and other harmful contaminants.
4. Substrate construction in accordance with substrate material manufacturer’s specifications and applicable building codes.

D. Ensure that flashing has been installed per Specification Section 07 60 00 - Flashing and Sheet Metal.

E. Advise Contractor of discrepancies preventing proper installation of the stucco assembly. Do not proceed with the stucco assembly work until unsatisfactory conditions are corrected.

3.2 PREPARATION


B. Concrete (Cast-in-Place): Provide a surface that is slightly scarified, water absorbent, straight and true to line and plane. Remove form ties and trim projecting concrete so it is even with the plane of the wall. Remove form release agents. Pre-moisten the surface with water just prior to placement of stucco, or apply one uniform coat of acrylic emulsion additive according to application instructions.

C. Concrete Masonry Units: Remove projecting joint mortar so it is flush with the plane of the wall. Remove surface contaminants such as efflorescence, existing paint or any other bond inhibiting material by sandblasting, waterblasting, wire brushing, chipping or other appropriate means. Pre-moisten the surface with water just prior to placement of stucco, or apply one uniform coat of acrylic emulsion additive according to application instructions.

3.3 MIXING

A. Mix proprietary products in accordance with manufacturer’s instructions and applicable Product Data Sheets.

3.4 APPLICATION

A. General: Stucco assembly and its related materials shall conform to the requirements of ICC-ES Evaluation Report No. 2564 and shall conform to this specification.

B. Water Resistive Barrier:

1. Install two layers of grade D minimum.

   a. The material must be a code approved, water vapor permeable water resistive barrier.

C. Stucco Base:

1. Stucco Base shall be applied in one or two coats to a minimum thickness of 3/8 in (9.5 mm) by hand troweling or machine spraying the mixture to the wire lath in accordance with product data Sheets. The maximum thickness applied in one pass is 1/2 in (17 mm).

2. Rod surface to true plane and float to densify.

3. While material is still wet, embed fiberglass mesh over lapping edges 2 inches.
4. Trowel to smooth and uniform surface to receive acrylic polymer finish coat.

D. Finish:
1. Remove surface contaminants such as dust or dirt without damaging the substrate.
2. Ambient and surface temperature must be 40°F (4°C) or higher during application and drying time. Supplemental heat and protection from precipitation must be provided as needed.
3. Use only on surfaces that are sound, clean, dry, unpainted, and free from any residue that might affect the ability of the finish to bond to the surface.
4. Apply exterior wall finish coats according to manufacturer’s product data sheets.
5. Protect finish coats from inclement weather until completely dry.

E. Curing
1. Stucco Base and Finish: Keep stucco moist for at least 48 hours (longer in dry weather) by lightly fogging walls. Start light fogging after initial set of 1–2 hours.

3.5 CLEAN-UP
A. Repair or replace work to eliminate cracks, dents, blisters, buckles, crazing and check cracking, dry outs, efflorescence, sweat outs, and similar defects and where bond to substrate has failed.
B. Removal: Remove and legally dispose of stucco assembly component debris material from job site.

3.6 PROTECTION
A. Provide protection of installed materials from water infiltration into or behind them.
B. Provide protection of installed stucco from dust, dirt, precipitation, and freezing during installation.
C. Provide protection of installed finish from dust, dirt, precipitation, freezing and continuous high humidity until fully cured and dry.
D. Clean exposed surfaces using materials and methods recommended by the manufacturer of the material or product being cleaned. Remove and replace work that cannot be cleaned to the satisfaction of the Project Designer/Owner.

END OF SECTION 09 2400
SECTION 09 2900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Interior gypsum board.
   2. Exterior gypsum board for ceilings and soffits.
   3. Tile backing panels.
   4. Texture finishes.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. Samples:
   1. Textured Finishes: 24” x 24” for each textured finish indicated and on same backing indicated for Work.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 119 by an independent testing agency.
B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated according to ASTM E 90 and classified according to ASTM E 413 by an independent testing agency.
C. Low Emitting Materials: For ceiling and wall assemblies, provide materials and construction identical to those tested in assembly and complying 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."

2.2 GYPSUM BOARD, GENERAL
A. Regional Materials: Gypsum panel products shall be manufactured within 500 miles (800 km) of Project site from materials that have been extracted, harvested, or recovered, as well as manufactured, within 500 miles (800 km) of Project site.
2.3 INTERIOR GYPSUM BOARD

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. American Gypsum.
   2. CertainTeed Corporation.
   3. Georgia-Pacific Building Products.
   5. Temple-Inland Building Products by Georgia-Pacific.

B. Gypsum Board, Type X: ASTM C 1396/C 1396M.
   1. Thickness: 5/8 inch (15.9 mm).
   2. Long Edges: Tapered

C. Gypsum Wallboard: ASTM C 1396/C 1396M.
   1. Thickness: Additive Alternate: 1/2 inch (12.7 mm).
   2. Long Edges: Tapered

2.4 EXTERIOR GYPSUM BOARD FOR CEILINGS AND SOFFITS

A. Exterior Gypsum Soffit Board: ASTM C 1396/C 1396M, with manufacturer's standard edges.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. American Gypsum.
      b. CertainTeed Corporation.
      c. Georgia-Pacific Building Products.
      e. Temple-Inland Building Products by Georgia-Pacific.
      f. United States Gypsum Company.
   2. Core: 5/8 inch (15.9 mm), Type X.

B. Glass-Mat Gypsum Sheathing Board: ASTM C 1177/C 1177M, with fiberglass mat laminated to both sides and with manufacturer's standard edges.
   1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
      a. CertainTeed Corporation.
      b. Georgia-Pacific Building Products.
      c. National Gypsum Company.
      d. Temple-Inland Building Products by Georgia-Pacific.
2. Core: **5/8 inch (15.9 mm)**, Type X.

2.5 TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Backing Board: ASTM C 1178/C 1178M, with manufacturer's standard edges.
   1. **Manufacturers:** Subject to compliance with requirements, provide products by one of the following:
      a. CertainTeed Corporation.
      b. Georgia-Pacific Building Products.
      c. National Gypsum Company.
      d. Temple-Inland Building Products by Georgia-Pacific.
   2. Core: **5/8 inch (15.9 mm)**, Type X.
   3. Mold Resistance: ASTM D 3273, score of 10 as rated according to ASTM D 3274.

2.6 TRIM ACCESSORIES

A. Interior Trim: ASTM C 1047.
   1. Material: Galvanized or aluminum-coated steel sheet, rolled zinc, or paper-faced galvanized steel sheet.

   1. Material: Hot-dip galvanized steel sheet, plastic, or rolled zinc.

C. Aluminum Trim: ASTM B 221 (ASTM B 221M), Alloy 6063-T5.

2.7 JOINT TREATMENT MATERIALS

A. General: Comply with ASTM C 475/C 475M.

B. Joint Tape:
   1. Interior Gypsum Board: Paper.
   4. Tile Backing Panels: As recommended by panel manufacturer.

C. Joint Compound for Interior Gypsum Board: For each coat use formulation that is compatible with other compounds applied on previous or for successive coats.

2.8 AUXILIARY MATERIALS

A. Laminating Adhesive: Adhesive or joint compound recommended for directly adhering gypsum panels to continuous substrate.
   1. Laminating adhesive shall have a VOC content of **50 g/L** or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
2. Laminating adhesive 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."

B. Steel Drill Screws: ASTM C 1002, unless otherwise indicated.

C. Sound Attenuation Blankets: ASTM C 665, Type I (blankets without membrane facing).

D. Acoustical Joint Sealant: ASTM C 834. Product effectively reduces airborne sound transmission through perimeter joints and openings as demonstrated by testing according to ASTM E 90.
   1. Acoustical joint sealant shall have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
   2. Acoustical joint sealant 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. Thermal Insulation: As specified in Section 07 2100 "Thermal Insulation."

F. Vapor Retarder: As specified in Section 07 2600 "Vapor Retarders."

2.9 TEXTURE FINISHES

A. Primer: As recommended by textured finish manufacturer.
   1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
      a. Georgia-Pacific Building Products.
      c. United States Gypsum Company.

B. Non-Aggregate Finish: Pre-mixed, vinyl texture finish for spray application.
   1. Texture: Orange Peel

PART 3 - EXECUTION

3.1 APPLYING AND FINISHING PANELS

A. Comply with ASTM C 840.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, and mold damaged.

C. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments, except floors. Provide 1/4- to 1/2-inch- (6.4- to 12.7-mm-) wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.
D. Install trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim according to manufacturer's written instructions.
   1. Aluminum Trim: Install in locations indicated on Drawings.
   2. Control Joints: Install control joints according to ASTM C 840 and in specific locations approved by Architect for visual effect.

E. Prefill open joints and damaged surface areas.

F. Apply joint tape over gypsum board joints, except for trim products specifically indicated as not intended to receive tape.

G. Gypsum Board Finish Levels: Finish panels to levels indicated below and according to ASTM C 840:
   1. Level 3: At all locations

H. Texture Finish Application: Prepare and apply primer to gypsum panels and other surfaces receiving texture finishes. Mix and apply finish using powered spray equipment, to produce a uniform texture matching approved mockup and free of starved spots or other evidence of thin application or of application patterns.

I. Protect adjacent surfaces from drywall compound and texture finishes and promptly remove from floors and other non-drywall surfaces. Repair surfaces stained, marred, or otherwise damaged during drywall application.

J. Remove and replace panels that are wet, moisture damaged, and mold damaged.

END OF SECTION 09 2900
SECTION 09 3013 - CERAMIC TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Glazed Porcelain tile.
   2. Crack isolation membrane.
   3. Metal edge strips.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. LEED Submittals:
   1. Product Data: For adhesives, documentation including printed statement of VOC content.
   2. Product Data: For grout sealers, documentation indicating that products comply with requirements of FloorScore certification.

C. Samples:
   1. Assembled samples mounted on a rigid panel, with grouted joints, for each type and composition of tile and for each color and finish required. This can be the mock-up indicated below under 1.5.B

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering for storage and identified with labels describing contents.

   1. Tile and Trim Units: Furnish quantity of full-size units equal to 2 percent of amount installed for each type, composition, color, pattern, and size indicated.

1.5 QUALITY ASSURANCE

A. Installer Qualifications:
   1. Installer is licensed tile contractor in State of New Mexico – GS-03

B. Mockups: Build mockups to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockup of wall tile installation.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

PART 2 - PRODUCTS

2.1 PRODUCTS, GENERAL
   A. ANSI Ceramic Tile Standard: Provide Standard-grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
   B. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.

2.2 TILE PRODUCTS
   A. Glazed Porcelain Tile: rectified wall tile.
      1. Mohawk is the basis of design
      2. Composition: Glazed Porcelain.
      3. Certification: Porcelain tile certified by the Porcelain Tile Certification Agency.
      4. Module Size: 12 by 24 inch (vertical)
      5. Thickness: 5/16 inch.
      7. Scratch Hardness: 8.
      8. Surface: Slip resistant ≥0.42 wet.
      10. Face: Pattern with tile laid vertically, with manufacturer's standard edges.
      11. Face Size Variation: Rectified.
      12. Grout Color: 1/16” grout joint or less. As selected by Architect from manufacturer's full range.
   B. Accessories: Provide vitreous china accessories of type and size indicated, suitable for installing by same method as used for adjoining wall tile.
      1. One soap holder for each shower/tub indicated.
      2. Color and Finish: As selected by Architect from manufacturer's full range.

2.3 SETTING MATERIALS
   A. Latex-Portland Cement Mortar (Thinset): ANSI A118.4.
      1. Pro-Lite from Customs
2. Mapei
3. Provide prepackaged, dry-mortar mix combined with liquid-latex additive at Project site.
4. For wall applications, provide nonsagging mortar.

2.4 GROUT MATERIALS
   1. Customs Grout, unsanded
   2. Mapei Grout, unsanded

2.5 MISCELLANEOUS MATERIALS
A. Metal Edge Strips: Angle or L-shape, height to match tile and setting-bed thickness, metallic or combination of metal and PVC or neoprene base, designed specifically for flooring applications; to match faucet finish exposed-edge material.
   1. Schluter Systems
B. Grout Sealer
   1. Grout sealers shall comply with requirements of FloorScore certification.
   2. Grout sealers shall comply with the testing and product requirements of the California Department of Public Health's (formerly, the California Department of Health Services') "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Small-Scale Environmental Chambers."

PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.
   1. Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.
   2. Verify that concrete substrates for tile floors installed with thinset mortar comply with surface finish requirements in ANSI A108.01 for installations indicated.
B. Proceed with installation only after unsatisfactory conditions have been corrected.
3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thinset mortar with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.

B. Where indicated, prepare substrates to receive waterproofing by applying a reinforced mortar bed that complies with ANSI A108.1A and is sloped 1/4 inch per foot toward drains.

C. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

3.3 CERAMIC TILE INSTALLATION

A. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.

1. For the following installations, follow procedures in the ANSI A108 series of tile installation standards for providing 95 percent mortar coverage:

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Exposed tile edges shall have exposed metal strips see 2.5.A above no tile specialty shapes required.

E. If there are accent tiles where accent tile differs in thickness from field tile, vary setting bed thickness so that tiles are flush.

F. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

G. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:

1. Porcelain Tile: 1/16 inch.

H. Metal Edge Strips: Install where exposed edge of tile wall meets wall.

3.4 INTERIOR CERAMIC TILE INSTALLATION SCHEDULE

A. Interior Wall Installations, Wood or Wood Furring:
1. Ceramic Tile Installation kitchen backsplash; thinset mortar on water-resistant gypsum backer board (non-paper faced)
   a. Ceramic Tile Type: Glazed Porcelain

B. Bathtub Wall Installations with No Shower Head, Wood or Metal Studs or Furring:
   1. Ceramic Tile Installation; thinset mortar on water-resistant gypsum board.
      a. Ceramic Tile Type: Glazed Porcelain
SECTION 09 5123 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes acoustical tiles and concealed suspension systems for ceilings.

1.2 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
      1. Laboratory Test Reports for ceiling systems, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
   B. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS
   A. Product test reports.
   B. Evaluation reports.
   C. Field quality-control reports.

1.5 CLOSEOUT SUBMITTALS
   A. Maintenance data.

1.6 QUALITY ASSURANCE
   A. Testing Agency Qualifications: Qualified according to NVLAP.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Seismic Performance: Acoustical ceiling shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.
   B. Surface-Burning Characteristics: Comply with ASTM E 84; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.
      1. Flame-Spread Index: Comply with ASTM E 1264 for Class B materials.
2. Smoke-Developed Index: 50 or less.

2.2 ACOUSTICAL TILE CEILINGS, GENERAL

A. Low-Emitting Materials: Acoustical tile ceilings 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."

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

C. Acoustical Tile Standard: Comply with ASTM E 1264.

D. Metal Suspension System Standard: Comply with ASTM C 635.

E. Attachment Devices: Size for five times the design load indicated in ASTM C 635, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

2.3 ACOUSTICAL TILES

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Armstrong World Industries, Inc.
   2. United States Gypsum Company.

B. Classification: Wet formed mineral fiber, Cirrus pattern.

C. Color: White.

D. LF: 0.85

E. NRC: 0.70

F. CAC: 35

G. AC: 170

H. Edge/Joint Detail: 15/16 angled tegular.

I. Thickness: 3/4 inch.

J. Modular Size: As indicated on Drawings.

2.4 METAL SUSPENSION SYSTEM

A. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
   1. Armstrong World Industries, Inc.
   2. United States Gypsum Company.

B. Structural Classification: Intermediate duty system.

C. Access: Upward.
D. Roll-Formed, Sheet-Metal Edge Moldings and Trim: Manufacturer's standard moldings for edges and penetrations complying with seismic design requirements; formed from sheet metal of same material, finish, and color as that used for exposed flanges of suspension-system runners.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Install acoustical tile ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Measure each ceiling area and establish layout of acoustical tiles to balance border widths at opposite edges of each ceiling. Avoid using less-than-half-width tiles at borders, and comply with layout shown on reflected ceiling plans.

C. Arrange directionally patterned acoustical tiles as indicated on reflected ceiling plans.

END OF SECTION 09 5123
SECTION 09 6519 - RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Solid vinyl floor tile.

1.2 ACTION SUBMITTALS
A. Product Data: For each type of product.
B. LEED Submittals:
   1. Product Data: For adhesives and sealants, documentation including printed statement of VOC content.
   2. Product Data: For resilient tile flooring, documentation from an independent testing agency indicating compliance with the FloorScore standard.
C. Shop Drawings: For each type of floor tile. Include floor tile layouts, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
   1. Show details of special patterns.
D. Samples: Full-size units of each color and pattern of floor tile required.

1.3 CLOSEOUT SUBMITTALS
A. Maintenance data.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
A. FloorScore Compliance: Resilient tile flooring shall comply with requirements of FloorScore certification.

2.2 SOLID VINYL FLOOR TILE
A. Luxury Vinyl Tile by Mohawk is the basis of design
B. Tile Standard: ASTM F 1700.
   2. Type: B, embossed surface.
C. Thickness: 0.120 inch (3.0 mm).
D. Size: 6 by 48 inches.
E. Colors and Patterns: C9007 configuration and P008S Cottage Grey color

2.3 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by floor tile manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by floor tile and adhesive manufacturers to suit floor tile and substrate conditions indicated.
   1. Adhesives shall comply with the following limits for VOC content:
      a. Laminated Vinyl Tile Adhesives: 50 g/L or less.

C. Floor Polish: Provide protective, liquid floor-polish products recommended by floor tile manufacturer.

PART 3 - EXECUTION

3.1 PREPARATION

A. Prepare substrates according to floor tile manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates: Prepare according to ASTM F 710.
   1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
   2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by floor tile manufacturer. Do not use solvents.
   3. Alkalinity and Adhesion Testing: Perform tests recommended by floor tile manufacturer. Proceed with installation only after substrate alkalinity falls within range on pH scale recommended by manufacturer in writing, but not less than 5 or more than 10 pH.
   4. Moisture Testing: Proceed with installation only after substrates pass testing according to floor tile manufacturer's written recommendations, but not less stringent than the following:
      a. Perform anhydrous calcium chloride test according to ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lbs of water/1000 sq. ft. in 24 hours.
      b. Perform relative humidity test using in situ probes according to ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound; remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install floor tiles until they are the same temperature as the space where they are to be installed.
E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient floor tile.

3.2 FLOOR TILE INSTALLATION
A. Comply with manufacturer’s written instructions for installing floor tile.
B. Lay out floor tiles from center marks established with principal walls, discounting minor offsets, so tiles at opposite edges of room are of equal width. Adjust as necessary to avoid using cut widths that equal less than one-half tile at perimeter.
   1. Lay tiles square with room axis in pattern indicated in drawings
C. Match floor tiles for color and pattern by selecting tiles from cartons in the same sequence as manufactured and packaged, if so numbered. Discard broken, cracked, chipped, or deformed tiles.
   1. Lay tiles with grain running in one direction.
D. Scribe, cut, and fit floor tiles to butt neatly and tightly to vertical surfaces and permanent fixtures including built-in furniture, cabinets, pipes, outlets, and door frames.
E. Extend floor tiles into toe spaces, door reveals, closets, and similar openings. Extend floor tiles to center of door openings.
F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on floor tiles as marked on substrates. Use chalk or other nonpermanent marking device.
G. Adhere floor tiles to flooring substrates using a full spread of adhesive applied to substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

3.3 CLEANING AND PROTECTION
A. Comply with manufacturer’s written instructions for cleaning and protecting floor tile.
B. Cover floor tile until Substantial Completion.

END OF SECTION 09 6519
SECTION 09 6816 - SHEET CARPETING

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes tufted carpet and carpet cushion.

1.2 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project site.

1.3 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. LEED Submittals:
      1. Product Data:
         a. For carpet, documentation indicating compliance with testing and product requirements of CRI's "Green Label Plus" program.
         b. For carpet cushion, documentation indicating compliance with testing and product requirements of CRI's "Green Label" program.
         c. For installation adhesive, including printed statement of VOC content.
   C. Samples: For each exposed product and for each color and texture specified.

1.4 INFORMATIONAL SUBMITTALS
   A. Product test reports.
   B. Warrant: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS
   A. Maintenance data.

1.6 QUALITY ASSURANCE
   A. Installer Qualifications: An experienced Installer who is licensed carpet contractor in State of New Mexico – GS-03.
   B. Fire-Test-Response Ratings: Where indicated, provide carpet and carpet cushion identical to those of assemblies tested for fire response per NFPA 253 by a qualified testing agency.

1.7 DELIVERY, STORAGE, AND HANDLING
   A. Comply with CRI 104.
1.8 FIELD CONDITIONS
   A. Comply with CRI 104 for temperature, humidity, and ventilation limitations.

1.9 WARRANTY
   A. Special Warranty for Carpet: Manufacturer agrees to repair or replace components of carpet installation that fail in materials or workmanship within specified warranty period.
      1. Warranty includes “Lifetime Stain and Soil”
      2. 20-Year abrasive wear, texture retention, fade resistance, and manufacturing defects
      3. Warranty does not include deterioration or failure of carpet due to unusual traffic, failure of substrate, vandalism, or abuse.
      4. Failures include, but are not limited to, more than 10 percent loss of face fiber, edge raveling, snags, runs, and delamination.
      5. Installation Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 TUFTED CARPET -Broadloom
   A. Mohawk is the basis of design
   B. Color: 755 Homestead
   C. Style: 1S59 Classic Cadence
   D. Fiber Content: 100% Smartstrand BCF Triexta
   E. Pile Characteristic: Cut
   F. Primary Backing: Manufacturer's standard material
   G. Secondary Backing: Manufacturer's standard material
   H. Backcoating: Manufacturer's standard material
   I. Width: 12 feet
   J. Applied Soil-Resistance Treatment: Manufacturer's standard material.
   K. Antimicrobial Treatment: Manufacturer's standard material.
      1. Emissions: Provide carpet that complies with testing and product requirements of CRI's “Green Label Plus” program.

2.2 CARPET CUSHION
   A. Submit manufacturer product for approval
   B. Traffic Classification: CCC Class I, moderate traffic.
   C. Rebound Pad:
      1. Thickness: 3/8” plus 5 percent maximum.
2. Density: 5.5 lb/cu. ft.
3. Emissions: Provide carpet cushion that complies with testing and product requirements of CRI's "Green Label" program.

2.3 INSTALLATION ACCESSORIES
A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet cushion manufacturer.
B. Adhesives: Water-resistant, mildew-resistant, nonstaining type to suit products and subfloor conditions indicated, that complies with flammability requirements for installed carpet and is recommended or provided by carpet and carpet cushion manufacturers.
   1. Use adhesives with VOC content not more than 50 g/L when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
C. Tackless Carpet Stripping: Water-resistant plywood, in strips as required to match cushion thickness and that comply with CRI 104, Section 12.2.
D. Seam Adhesive: Hot-melt adhesive tape or similar product recommended by carpet manufacturer for sealing and taping seams and butting cut edges at backing to form secure seams and to prevent pile loss at seams.

PART 3 - EXECUTION
3.1 INSTALLATION
A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet performance. Examine carpet for type, color, pattern, and potential defects.
B. Concrete Subfloors: Verify that concrete slabs comply with ASTM F 710.
C. Proceed with installation only after unsatisfactory conditions have been corrected.
D. Preparation: Comply with CRI 104, Section 7.3, "Site Conditions; Floor Preparation," and with carpet manufacturer’s written installation instructions for preparing substrates.
E. Installation: Comply with CRI 104 and carpet and carpet cushion manufacturers’ written installation instructions for the following:
   1. Carpet with Attached-Cushion Installation: Comply with CRI 104, Section 11, "Attached-Cushion Installations."
   2. Preapplied Adhesive Installation: Comply with CRI 104, Section 11.4, "Pre-Applied Adhesive Systems (Peel and Stick)."
   3. Hook-and-Loop Installation: Comply with CRI 104, Section 11.5, "Hook and Loop Technology."
   4. Stretch-in Installation: Comply with CRI 104, Section 12, "Stretch-in Installations."
F. Comply with carpet manufacturer's written recommendations and Shop Drawings for seam locations and direction of carpet; maintain uniformity of carpet direction and lay of pile. At doorways, center seams under the door in closed position.

G. Do not bridge building expansion joints with carpet.

H. Cut and fit carpet to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet manufacturer.

I. Extend carpet into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

J. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on finish flooring as marked on subfloor. Use nonpermanent, nonstaining marking device.

K. Comply with carpet cushion manufacturer's written recommendations. Install carpet cushion seams at 90-degree angle with carpet seams.

L. Perform the following operations immediately after installing carpet:
   1. Remove excess adhesive, seam sealer, and other surface blemishes using cleaner recommended by carpet manufacturer.
   2. Remove yarns that protrude from carpet surface.

M. Protect installed carpet to comply with CRI 104, Section 16, "Protecting Indoor Installations."

END OF SECTION 09 6816
SECTION 09 9800 - GYPSUM SLURRY FLOORING UNDERLAYMENT

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Interior finish flooring Gypsum Slurry Floor Underlayment System covering normal
      project conditions and applications.

1.2 REFERENCES

A. WBENC      WBENC Certified Business Enterprise www.maxxon.com
B. Underwriters Laboratory Fire Resistance Volume 1 www.ul.com
C. GREENGUARD Certified GREENGUARD Certified and GREENGUARD Gold Certified www.greenguard.org
D. ASTM E336 and E1007 Field Sound Transmission Class (F-STC), Field Impact
   Insulation Class (F-IIC)
E. ASTM E90 and E492 Sound Transmission Class (STC), Impact Insulation Class (IIC)
F. ASTM C472M Compressive strength of gypsum concrete
G. ASTM F2170 Standard Test Method for Determining Relative Humidity in
   Concrete Floor Slab
H. ASTM F2419 Standard Test Method for Installation of Thick Poured Gypsum
   Concrete and Preparation of Surface to Receive Resilient Flooring
I. ASTM F2678 Standard Practice for Preparing Panel Underlayments, Thick
   Poured Lightweight Cellular Concrete Underlayments, and Concrete Subfloors with Underlayment Patching Compounds
   to Receive Resilient Flooring
K. NWFA National Wood Flooring Association Instructions www.nwfa.org
L. Fin Flr Goods Procedures Maxxon Procedures for Attaching Finished Floor Goods to
   Maxxon Underlayments www.maxxon.com

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product: Submit sale sheets Gyp-Crete Sales Sheet, Acousti-
   Mat Ultimate Sound Control Systems, Procedures for Attaching Finished Floor Goods to
Maxxon Underlayments, and Maxxon’s Building Conditions Guide with project materials clearly identified for each required product or system.

B. Acoustical Data: Submit sound tests according to IBC code criteria ASTM E492 (IIC) and ASTM E90 (STC) or ASTM E1007 (F-IIC) and E336 (F-IIC).

1.4 SYSTEM REQUIREMENTS

A. Performance Requirements:
   1. Gyp-Crete Floor Underlayment
      a. Compressive strength up to 2,200 psi (up to 15 Mpa)
      b. Density 110 pounds per cubic foot (1,762 kg/m3)

B. Sound Control – 2009 International Building Code: Section 12 07.2 & .3
   1. Minimum Sound Transmission Class, 50 STC (45 if field tested) – Section 12 07.2
      a. ASTM E90 and E336
   2. Minimum Impact Insulation Class, 50 IIC (45 if field tested) – Section 12 07.3
      a. ASTM E492 and E1007

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project Site.

1.6 QUALITY ASSURANCE

A. Performance Standards:
   1. All materials, unless otherwise indicated, shall be manufactured by Maxxon Corporation and shall be installed in accordance with its current printed directions and by a Maxxon Corporation Authorized Applicator.
   2. Underlayment mix shall be tested for a slump using a 2" (i.d.) x 4" (50 mm x 101 mm) cylinder resulting in a patty size of 8 1/2” (216 mm) plus or minus 1 inch (25 mm) diameter.
   3. Compressive strength tested in accordance with ASTM C 472M.

1.7 DELIVERY, STORAGE AND HANDLING

A. All materials shall be delivered in their original unopened packages and protected from damage and exposure from the elements. Damaged or deteriorated materials shall be removed from the premises.

1.8 PROJECT CONDITIONS

A. Before, during and after installation of product, building interior shall be enclosed, with adequate ventilation and heat maintained at a temperature above 50 °F (10 °C) to allow for drying of product.
PART 2 - PRODUCTS

2.1 MATERIALS
   A. Proprietary products/systems: Poured flooring underlayment and topping products, including the following:
      1. Gyp-Crete Floor Underlayment
   B. Mix Water:
      1. Material Standard: Potable, free from impurities and from a domestic source.
   C. Sand Aggregate:

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Site Verification of Conditions:
      1. Installation shall not begin until the building is enclosed, including roof, windows, doors, and any other apertures.
      2. Wood substrate shall be structurally sound, properly fastened, and dry. Contractor shall clean subfloor to remove mud, oil, grease, and other contaminating factors before arrival of the authorized applicator.
      3. Wood substrate:
         a. The wood subfloor must be adequate to withstand live and dead loads with a deflection limitation of L/360. Density 110 pounds per cubic foot (1,762 kg/m³).
         b. Wood should be agency approved 23/32” (1.8cm) T & G subfloor sheathing.

3.2 REQUIREMENTS
   A. Leak Prevention:
      1. Fill cracks and voids in subfloor where leakage of slurry could occur.
   B. Priming subfloor:
      1. Prime substrate according to manufacturer’s recommendations.
   C. Application:
      1. Install in accordance with reference standards and manufacturer’s instructions.

3.3 GENERAL INSTALLATION INSTRUCTIONS
   A. Mixing Proportions:
1. General Requirements: Mix proportions and methods shall be in strict accordance with product manufacturer recommendations.

B. Application:
1. (Optional) Acousti-Mat Installations: Install Acousti-Mat following manufacturer's recommendations and specifications
2. Pour floor topping to recommended thickness. Immediately spread and screed product to a smooth surface. Expansion joints in all types of work shall be brought through the underlayment.
   a. Minimum Maxxon Underlayment Depth: Acousti-Mat LPR $\frac{3}{4}$” (1.9 cm)

C. Drying:
1. The general contractor must provide and maintain correct environmental conditions to keep the building clean and dry, and protect against infestation of moisture from a variety of potential sources. The general contractor must supply mechanical ventilation and heat if necessary to remove moisture from the area until the Gyp-Crete is dry.
2. Protection from Heavy Loads: During construction, place temporary wood planking over Gyp-Crete wherever it will be subject to heavy wheeled or concentrated loads.

3.4 PREPARATION FOR INSTALLATION OF GLUE DOWN FLOOR GOODS
A. Sealing:
1. Seal all areas that receive glue down floor goods with Maxxon Overspray or Maxxon Acrylic according to the Maxxon Corporation's specifications. Any floor areas where the surface has been damaged shall be cleaned and sealed regardless of floor covering to be used. Where floor goods manufacturers require special adhesive or installation systems, their requirements supersede these recommendations.
2. Maxxon UWR can be used over Maxxon underlayments in low traffic areas such as utility rooms, storage rooms and closets, as a protective surface.

B. Moisture Testing:
1. ASTM F2170 Test Method for Determining Relative Humidity in Concrete. Follow the respective floor goods manufacturers’ recommendations for relative humidity requirements. When manufacturer does not have a relative humidity requirement, refer to Maxxon’s Procedures for Attaching Finished Floor Goods to Maxxon Underlayments brochure.

C. Finished Floor Goods:
1. There are many reference standards for the installation procedures and recommendations for finished flooring applications over gypsum underlayments. These include instructions of the manufacturers of thefinished flooring, adhesives and thin-set as well as national agency reference standards. The national standards are listed below:
   a. Flooring Type Reference Standard
   b. Resilient ASTM F2419
c. Ceramic Tile TCNA F180

END OF SECTION 09 8000
SECTION 09 9113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes surface preparation and the application of paint systems on exterior substrates:
   1. Concrete.
   2. Concrete masonry units (CMU).
   3. Steel.
   5. Aluminum (not anodized or otherwise coated).
   7. Cementitious fiberboard panels
   8. Exterior gypsum board.

1.2 DEFINITIONS
A. Gloss Level 1: Not more than 5 units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.
B. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product. Include preparation requirements and application instructions.
B. Samples: For each type of paint system and each color and gloss of topcoat.
C. Product List: For each product indicated. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

1.4 MAINTENANCE MATERIAL SUBMITTALS
A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
   1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.
1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
   a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
   b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.
   a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2. Benjamin Moore & Co.
3. Dunn-Edwards Corporation.
4. Kwal Paint; Comex Group.
5. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

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.

2.3 BLOCK FILLERS
   A. Block Filler, Latex, Interior/Exterior:

2.4 PRIMERS/SEALERS
   A. Primer, Bonding, Water Based: [MPI #17.]

2.5 METAL PRIMERS
   A. Primer, Alkyd, Anti-Corrosive for Metal: [MPI #79.]
   B. Primer, Galvanized: As recommended in writing by topcoat manufacturer.

2.6 WATER-BASED PAINTS
   A. Latex, Exterior Flat (Gloss Level 1): [MPI #10.]
   B. Latex, Exterior Semi-Gloss (Gloss Level 5): [MPI #11.]

2.7 SOLVENT-BASED PAINTS
   A. Alkyd, Exterior Flat (Gloss Level 1): [MPI #8.]

2.8 FLOOR COATINGS
   A. See Division 03 3000 for concrete sealer.

PART 3 - EXECUTION

3.1 EXAMINATION
   A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
   B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
      1. Concrete: 12 percent.
      3. Gypsum Board: 12 percent.
   C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
   D. Proceed with coating application only after unsatisfactory conditions have been corrected.
      1. Application of coating indicates acceptance of surfaces and conditions.
3.2 PREPARATION
A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates and paint systems indicated.
B. 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.

3.3 APPLICATION
A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Manual."
B. 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.

3.4 CLEANING AND PROTECTION
A. 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.
B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 EXTERIOR PAINTING SCHEDULE
A. CMU Substrates:
   1. Latex System:
      a. Prime Coat: Block filler, latex, interior/exterior[, MPI #4].
      c. Topcoat: Latex, exterior semi-gloss (Gloss Level 5)[, MPI #11].
B. Steel Substrates:
   1. Alkyd System:
      a. Prime Coat: Primer, alkyd, anticorrosive for metal[, MPI #79].
      b. Prime Coat: Shop primer specified in Section where substrate is specified.
      d. Topcoat: Alkyd, exterior, semi-gloss (Gloss Level 5)[, MPI #94].
C. Galvanized-Metal Substrates:
   1. Latex System:
a. Prime Coat: Primer, galvanized metal, as recommended in writing by topcoat manufacturer for exterior use on galvanized-metal substrates with topcoat indicated.


c. Topcoat: Latex, exterior semi-gloss (Gloss Level 5), MPI #11.

D. Exterior Gypsum Board Substrates:
   1. Latex System:
      c. Topcoat: Latex, exterior flat (Gloss Level 1), MPI #10.

E. Cementitious fiberboard panels:
   1. Factory applied primer
   2. Latex System:
      c. Topcoat: Latex, exterior flat (Gloss Level 1), MPI #10.

END OF SECTION 09 9113
SECTION 09 9123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes surface preparation and the application of paint systems on interior substrates:
   1. Concrete masonry units (CMU).
   2. Steel.
   4. Wood.
   5. Gypsum board.

1.2 DEFINITIONS
A. Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.
B. Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.
C. Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

1.3 ACTION SUBMITTALS
A. Product Data: For each type of product. Include preparation requirements and application instructions.
B. LEED Submittals:
   1. Product Data for paints and coatings, including printed statement of VOC content.
   2. Laboratory Test Reports for paints and coatings, documentation indicating that they meet the testing and product requirements of the California Department of Public Health's "Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers."
C. Samples: For each type of paint system and in each color and gloss of topcoat.
D. Product List: For each product indicated. Include printout of current "MPI Approved Products List" for each product category specified in Part 2, with the proposed product highlighted.

1.4 MAINTENANCE MATERIAL SUBMITTALS
A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.
1. Paint: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.5 QUALITY ASSURANCE

A. Mockups: Apply mockups of each paint system indicated and each color and finish selected to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each paint system specified in Part 3.
   a. Vertical and Horizontal Surfaces: Provide samples of at least 100 sq. ft. (9 sq. m).
   b. Other Items: Architect will designate items or areas required.

2. Final approval of color selections will be based on mockups.
   a. If preliminary color selections are not approved, apply additional mockups of additional colors selected by Architect at no added cost to Owner.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

2. Benjamin Moore & Co.
3. Dunn-Edwards Corporation.
4. Kwal Paint; Comex Group.
5. Rust-Oleum Corporation; a subsidiary of RPM International, Inc.

2.2 PAINT, GENERAL

A. MPI Standards: Provide products that comply with MPI standards indicated and that are listed in its "MPI Approved Products List."

B. Material Compatibility:

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 and, for interior paints and coatings applied at Project site, the following VOC limits, exclusive of colorants added to a tint base, when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Flat Paints and Coatings: 50 g/L.
2. Nonflat Paints and Coatings: 150 g/L.
3. 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.
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 Public Health’s “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.”

E. Colors: As selected by Architect from manufacturer’s full range.

2.3 BLOCK FILLERS
A. Block Filler, Latex, Interior/Exterior: [MPI #4.]

2.4 PRIMERS/SEALERS
A. Primer Sealer, Latex, Interior: [MPI #50.]
B. Primer Sealer, Interior, Institutional Low Odor/VOC: [MPI #149.]
C. Primer, Latex, for Interior Wood: [MPI #39.]
D. Primer, Bonding, Water Based: [MPI #17.]

2.5 METAL PRIMERS
A. Primer, Rust-Inhibitive, Water Based: [MPI #107.]

2.6 WATER-BASED PAINTS
A. Latex, Interior, (Gloss Level 4): [MPI #43.]
B. Latex, Interior, Semi-Gloss, (Gloss Level 5): [MPI #54.]
C. Latex, Interior, Institutional Low Odor/VOC, Semi-Gloss (Gloss Level 5): [MPI #147.]
PART 3 - EXECUTION

3.1 EXAMINATION
A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.
B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
   1. Concrete: 12 percent.
   3. Wood: 15 percent.
   4. Gypsum Board: 12 percent.
C. Verify suitability of substrates, including surface conditions and compatibility with existing finishes and primers.
D. Proceed with coating application only after unsatisfactory conditions have been corrected.
   1. Application of coating indicates acceptance of surfaces and conditions.

3.2 PREPARATION
A. Comply with manufacturer's written instructions and recommendations in "MPI Manual" applicable to substrates 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.

3.3 APPLICATION
A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."
B. 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.
3.4 CLEANING AND PROTECTION

A. 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.

B. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.5 INTERIOR PAINTING SCHEDULE

A. CMU Substrates:
   1. Latex System:
      a. Block Filler: Block filler, latex, interior/exterior[, MPI #4].
      c. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.

B. Steel Substrates:
   1. Institutional Low-Odor/VOC Latex System:
      a. Prime Coat: Primer, rust-inhibitive, water based[, MPI #107].
      c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (Gloss Level 5), MPI #147.

C. Wood Substrates: Including wood trim, architectural woodwork, doors.
   1. Latex System:
      a. Prime Coat: Primer, latex, for interior wood[, MPI #39].
      c. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.

D. Fiberglass and Plastic Substrates:
   1. Latex System:
      a. Prime Coat: Primer, bonding, water based[, MPI #17].
      c. Topcoat: Latex, interior, semi-gloss, (Gloss Level 5), MPI #54.

E. Gypsum Board Substrates:
   1. Latex System:
      a. Prime Coat: Primer sealer, latex, interior[, MPI #50].
      b. Prime Coat: Latex, interior, matching topcoat.
      d. Topcoat: Latex, interior, (Gloss Level 4), MPI #43.
F. Spray-Textured Ceiling Substrates:
   1. Latex System: Spray applied.
      c. Topcoat: Latex, interior, (Gloss Level 4), MPI #43.

END OF SECTION 09 9123
SECTION 10 1419 - DIMENSIONAL LETTER SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Cutout dimensional characters.
      2. Fabricated channel dimensional characters.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. LEED Submittals:
      1. Product Data for adhesives, documentation including printed statement of VOC content.
      2. Laboratory Test Reports for adhesives, documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."
   C. Shop Drawings: For dimensional letter signs.
      1. Include fabrication and installation details and attachments to other work.
      2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
      3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.
   D. Samples: For each exposed product and for each color and texture specified.
   E. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.3 INFORMATIONAL SUBMITTALS
   A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS
   A. Maintenance data.

1.5 WARRANTY
   A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
1. Warranty Period: 5 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 DIMENSIONAL LETTER SIGNS, GENERAL

2.2 PERFORMANCE REQUIREMENTS

A. Thermal Movements: For exterior **fabricated channel dimensional characters**, allow for thermal movements from ambient and surface temperature changes.
   1. Temperature Change: **120 deg F (67 deg C)**, ambient; **180 deg F (100 deg C)**, material surfaces.

B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

2.3 DIMENSIONAL CHARACTERS

A. Cutout Characters: Characters with uniform faces; square-cut, smooth edges; precisely formed lines and profiles; and as follows:
   1. Character Material: plate aluminum
   2. Character Height: As indicated.
   3. Thickness: **0.125 inch (3.18 mm)**.
   4. Finishes:
      a. Integral Aluminum Finish: As selected by Architect from full range of industry finishes.
      b. Overcoat: Manufacturer's standard baked-on clear coating.
   5. Mounting: Concealed studs at 30” vertical building signage. Bottom Mount for address characters at entry canopy

B. Fabricated Channel Characters: **Metal face and side returns**, formed free from warp and distortion; with uniform faces, sharp corners, and precisely formed lines and profiles; internally braced for stability and for securing fasteners; and as follows.
   2. Character Height: As indicated.
   3. Character Depth: **2” minimum**.
   4. Finishes:
      a. Baked-Enamel or Powder-Coat Finish: Manufacturer's standard, in color as selected by Architect from manufacturer's full range.
   5. Mounting: Projecting studs.
      a. Hold characters at **3/4-inch** distance from wall surface.
2.4 DIMENSIONAL CHARACTER MATERIALS
   A. Aluminum Plate.

2.5 ACCESSORIES
   A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
      1. Use concealed fasteners and anchors unless indicated to be exposed.
      2. For exterior exposure, furnish stainless-steel devices unless otherwise indicated.
      3. Exposed Metal-Fastener Components, General:
         a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.
      4. Sign Mounting Fasteners:
         a. Concealed Studs: Concealed (blind), threaded studs welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
         b. Projecting Studs: Threaded studs with sleeve spacer, welded or brazed to back of sign material, screwed into back of sign assembly, or screwed into tapped lugs cast integrally into back of cast sign material, unless otherwise indicated.
         c. Through Fasteners: Exposed metal fasteners matching sign finish, with type of head indicated, installed in predrilled holes.
   B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

2.6 FABRICATION
   A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
      1. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
      2. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed connections of flux, and dress exposed and contact surfaces.
      3. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
      4. Internally brace signs for stability and for securing fasteners.
      5. Provide rebates, lugs, and brackets necessary to assemble components and to attach to existing work. Drill and tap for required fasteners. Use concealed fasteners where possible; use exposed fasteners that match sign finish.
      6. Castings: Fabricate castings free of warp, cracks, blowholes, pits, scale, sand holes, and other defects that impair appearance or strength. Grind, wire brush, sandblast,
and buff castings to remove seams, gate marks, casting flash, and other casting marks before finishing.

B. Brackets: Fabricate brackets, fittings, and hardware for bracket-mounted signs to suit sign construction and mounting conditions indicated. Modify manufacturer's standard brackets as required.

1. Stainless-Steel Brackets: Factory finish brackets to match sign background finish unless otherwise indicated.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install signs using mounting methods indicated and according to manufacturer's written instructions.

1. Install signs level, plumb, true to line, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.

2. Before installation, verify that sign surfaces are clean and free of materials or debris that would impair installation.

3. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

B. Mounting Methods:

1. Concealed Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

   a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place sign in position and push until flush to surface, embedding studs in holes. Temporarily support sign in position until adhesive fully sets.

   b. Thin or Hollow Surfaces: Place sign in position and flush to surface, install washers and nuts on studs projecting through opposite side of surface, and tighten.

2. Projecting Studs: Using a template, drill holes in substrate aligning with studs on back of sign. Remove loose debris from hole and substrate surface.

   a. Masonry Substrates: Fill holes with adhesive. Leave recess space in hole for displaced adhesive. Place spacers on studs, place sign in position, and push until spacers are pinched between sign and substrate, embedding the stud ends in holes. Temporarily support sign in position until adhesive fully sets.

   b. Thin or Hollow Surfaces: Place spacers on studs, place sign in position with spacers pinched between sign and substrate, and install washers and nuts on stud ends projecting through opposite side of surface, and tighten.
3. Through Fasteners: Drill holes in substrate using predrilled holes in sign as template. Countersink holes in sign if required. Place sign in position and flush to surface. Install through fasteners and tighten.

4. Back Bar and Brackets: Remove loose debris from substrate surface and install backbar or bracket supports in position so that signage is correctly located and aligned.

5. Adhesive: Clean bond-breaking materials from substrate surface and remove loose debris. Apply linear beads or spots of adhesive symmetrically to back of sign and of suitable quantity to support weight of sign after cure without slippage. Keep adhesive away from edges to prevent adhesive extrusion as sign is applied and to prevent visibility of cured adhesive at sign edges. Place sign in position, and push to engage adhesive. Temporarily support sign in position until adhesive fully sets.

C. Remove temporary protective coverings and strippable films as signs are installed.

END OF SECTION 10 1419
SECTION 10 1426 - POST AND PANEL/PYLON SIGNAGE

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Nonilluminated post and panel signs.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Shop Drawings: For post and panel/pylon signage.
      1. Include fabrication and installation details and attachments to other work.
      2. Show sign mounting heights, locations of supplementary supports to be provided by others, and accessories.
      3. Show message list, typestyles, graphic elements, and layout for each sign at least half size.
   C. Samples: For each exposed product and for each color and texture specified.
   D. Sign Schedule: Use same designations specified or indicated on Drawings.

1.3 INFORMATIONAL SUBMITTALS
   A. Sample warranty.

1.4 CLOSEOUT SUBMITTALS
   A. Maintenance data.

1.5 WARRANTY
   A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.
      1. Warranty Period: five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Thermal Movements: For exterior signs, allow for thermal movements from ambient and surface temperature changes.
      1. Temperature Change: 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

2.2 POST AND PANEL/PYLON SIGNS

A. Post and Panel Sign: Sign of single-panel configuration; with smooth, uniform surfaces and support assembly; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Solid-Sheet Sign Panels: Aluminum sheet with finish specified in "Sign-Panel-Face Finish and Applied Graphics" Subparagraph below and as follows:
   b. Etched and Filled Graphics: Sign face etched or routed to receive enamel-paint infill.

2. Posts: Steel if not indicated in the drawings.
   a. Shape: Round.
   b. Size: 1-1/2-inch
   c. Installation Method: Sleeve if not indicated in drawings.
   d. Finish and Color: Mill.

3. Sign-Panel-Face Finish and Applied Graphics:
   a. Integral Aluminum Finish: Anodized color as selected by Architect from full range of industry colors and color densities.
   b. Integral Stainless-Steel Finish: As selected by Architect from full range of industry finishes.
   c. Baked-Enamel or Powder-Coat Finish and Graphics: Manufacturer's standard, in color as selected by Architect from manufacturer's full range.
   d. Painted Finish and Graphics: Manufacturer's standard, factory-applied as selected by Architect from manufacturer's full range.

2.3 ACCESSORIES

A. Fasteners and Anchors: Manufacturer's standard as required for secure anchorage of signage, noncorrosive and compatible with each material joined, and complying with the following:
   1. Use concealed fasteners and anchors unless indicated to be exposed.
   2. For exterior exposure, furnish stainless-steel or hot-dip galvanized devices unless otherwise indicated.
   3. Exposed Metal-Fastener Components, General:
      a. Fabricated from same basic metal and finish of fastened metal unless otherwise indicated.

B. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.
C. Anchoring Materials:

1. 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.

   a. Water-Resistant Product: At exterior locations, provide formulation that is resistant to erosion from water exposure without needing protection by a sealer or waterproof coating and that is recommended by manufacturer for exterior use.

2.4 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.
   1. Mill joints to tight, hairline fit. Form joints exposed to weather to resist water penetration and retention.
   2. Provide welds and brazes behind finished surfaces without distorting or discoloring exposed side. Clean exposed welded and brazed joints of flux, and dress exposed and contact surfaces.
   3. Conceal fasteners and anchors unless indicated to be exposed; locate exposed fasteners where they will be inconspicuous.
   4. Internally brace signs for stability and for securing fasteners.

B. Post Fabrication: Fabricate posts designed to withstand wind pressure indicated for Project location and of lengths required for installation method indicated for each sign.
   1. Aluminum Posts: Manufacturer's standard 0.125-inch- (3.18-mm-) thick, extruded-aluminum tubing unless otherwise indicated, with brackets or slots to engage sign panels.
   2. Steel Posts: Hot-dip galvanize post assemblies after fabrication according to ASTM A 123/A 123M.
      a. Provide drilled-in-place anchor bolts of size required for connecting posts to concrete foundations.
   4. Provide sleeves by manufacturer, sized to receive outside diameter of posts. Size sleeves for direct embedment in concrete foundations or concrete-filled postholes and to prevent sign movement, but not less than 24 inches (610 mm) for embedment.
PART 3 - EXECUTION

3.1 INSTALLATION

A. General: Install signs using installation methods indicated and according to manufacturer's written instructions.
   1. Install signs level, plumb, and at locations and heights indicated, with sign surfaces free of distortion and other defects in appearance.
   2. Install signs so they do not protrude or obstruct according to accessibility standard.
   3. Before installation, verify that sign components are clean and free of materials or debris that would impair installation.
   4. Corrosion Protection: Coat concealed surfaces of exterior aluminum in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

3.2 INSTALLING POSTS

A. Direct-Burial Method:
   1. Excavation: Excavate posthole to dimensions indicated. Reconstruct subgrade that is not firm, undisturbed, or compacted soil, or that is damaged by freezing temperatures, frost, rain, accumulated water, or construction activities by excavating an additional 12 inches (300 mm), backfilling with satisfactory soil or well-graded aggregate, and compacting to original subgrade elevation.
   2. Setting in Cast-in-Place Concrete: Set post in position, support to prevent movement, and place concrete in posthole or for concrete foundation as indicated.

B. Baseplate Method:
   1. Drilled-in-Place Anchor Bolts: Set post baseplate in position over concrete foundation, locate and drill anchor holes, shim and support post to prevent movement, place washers and anchor bolts, and tighten. Fill shim space with nonshrink, nonmetallic grout, mixed and placed to comply with manufacturer's written instructions.

END OF SECTION 10 1426
SECTION 10 2800 - TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Public-use washroom accessories.
      2. Private-use bathroom accessories.
      3. Under lavatory guards.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product indicated.
   B. Product Schedule: Indicating types, quantities, sizes, and installation locations by room of each accessory required.
      1. Identify locations using room designations indicated.

1.3 INFORMATIONAL SUBMITTALS
   A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS
   A. Maintenance data.

1.5 WARRANTY
   A. Special Mirror Warranty: Manufacturer's standard form in which manufacturer agrees to replace mirrors that develop visible silver spoilage defects and that fail in materials or workmanship within specified warranty period.
      1. Warranty Period: 2 years from date of Substantial Completion.

PART 2 - PRODUCTS

A. American Standard is the basis of design

B. Toilet Tissue (Roll) Dispenser:
   1. To match faucet manufacturer
   2. Description: Single-roll dispenser.
   4. Capacity: Designed for 4-1/2 diameter tissue rolls.
2.2 PRIVATE-USE BATHROOM ACCESSORIES

A. Toilet Tissue Dispenser:
1. To match faucet manufacturer.
2. Description: Single-roll dispenser.
4. Capacity: Designed for 4-1/2- diameter tissue rolls.
5. Material and Finish: Stainless steel, No. 4 finish (satin) or match faucet

B. Robe Hook:
1. To match faucet manufacturer.
2. Description: Double prong unit.
3. Material and Finish: Stainless steel, No. 4 finish (satin) or match faucet

C. Towel Bar:
1. To match faucet manufacturer.
2. Description: 3/4-inch-round tube with circular end brackets.
4. Length: 24 inches.
5. Material and Finish: Stainless steel, No. 4 finish (satin) or match faucet.

2.3 UNDERLAVATORY GUARDS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

1. Truebro by IPS Corporation.

B. Underlavatory Guard:
1. Description: Insulating pipe covering for supply and drain piping assemblies that prevent direct contact with and burns from piping; allow service access without removing coverings.

2.4 CUSTODIAL ACCESSORIES

A. Utility Shelf:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. American Specialties, Inc.
   b. AJW Architectural Products.
   c. Bobrick Washroom Equipment, Inc.
2. Description: With exposed edges turned down not less than 1/2 inch and supported by two triangular brackets welded to shelf underside.
3. Size: 16 inches long by 6 inches deep.
4. Material and Finish: Not less than nominal 0.05-inch-thick stainless steel, No. 4 finish (satin).

B. Mop and Broom Holder:
1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
2. Description: Unit with shelf, hooks, holders, and rod suspended beneath shelf.
3. Length: 36 inches.
5. Mop/Broom Holders: Four (4), spring-loaded, rubber hat, cam type.
   a. Shelf: Not less than nominal 0.05-inch-thick stainless steel.
   b. Rod: Approximately 1/4-inch-diameter stainless steel.

2.5 FABRICATION
   A. Keys: Provide universal keys for internal access to accessories for servicing and resupplying. Provide minimum of six (6) keys to Owner’s representative.

PART 3 - EXECUTION

3.1 INSTALLATION
   A. Install accessories according to manufacturers’ written instructions, using fasteners appropriate to substrate indicated and recommended by unit manufacturer. Install units level, plumb, and firmly anchored in locations and at heights indicated.
   B. Grab Bars: Install to withstand a downward load of at least 250 lbs, when tested according to ASTM F 446.

END OF SECTION 10 2800
SECTION 10 4413 - FIRE PROTECTION CABINETS

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes fire-protection cabinets for portable fire extinguishers.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Shop Drawings: For fire-protection cabinets.

1.3 CLOSEOUT SUBMITTALS
   A. Maintenance data.

1.4 COORDINATION
   A. Coordinate size of fire-protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.
   B. Coordinate sizes and locations of fire-protection cabinets with wall depths.

1.5 SEQUENCING
   A. Apply decals or vinyl lettering on field-painted fire-protection cabinets after painting is complete.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. Fire-Rated Fire-Protection Cabinets: Listed and labeled to comply with requirements in ASTM E 814 for fire-resistance rating of walls where they are installed.

2.2 FIRE-PROTECTION CABINET
   A. Cabinet Type: Suitable for fire extinguisher.
      1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
         a. Kidde Residential and Commercial Division.
   B. Cabinet Construction: 1-hour fire rated.
1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.043-inch- (1.09-mm-) thick cold-rolled steel sheet lined with minimum 5/8-inch- (16-mm-) thick fire-barrier material. Provide factory-drilled mounting holes.

C. Cabinet Material: Cold-rolled steel sheet

D. Semirecessed Cabinet (Floors 2-4, 1-Hr. fire rated): One-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend).

1. Rolled-Edge Trim: 4-inch (102-mm) backbend depth.

E. Surface-Mounted Cabinet (parking level only, No fire rating required): Cabinet box fully exposed and mounted directly on wall with no trim.

F. Cabinet Trim Material: Steel Sheet.

G. Door Material: Steel Sheet.

H. Door Style: Flush opaque panel, frameless, with no exposed hinges.

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

J. Accessories:

1. Door Lock: Cam lock that allows door to be opened during emergency by pulling sharply on door handle.

2. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as directed by Architect.

   a. Identify fire extinguisher in fire-protection cabinet with the words "FIRE EXTINGUISHER."

      1) Location: Applied to cabinet door.
      2) Application Process: Engraved
      3) Lettering Color: [Red]
      4) Orientation: [Vertical]

K. Materials:

1. Cold-Rolled Steel: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

   a. Finish: Baked enamel or powder coat.

   b. Color: As selected by Architect from full range of industry colors and color densities.

2. Stainless Steel: ASTM A 666, Type 304.

   a. Finish: No. 4 directional satin finish.

2.3 FABRICATION

A. Fire-Protection Cabinets: Provide manufacturer's standard box (tub) with trim, frame, door, and hardware to suit cabinet type, trim style, and door style indicated.
PART 3 - EXECUTION

3.1 INSTALLATION

A. Prepare recesses for semirecessed fire-protection cabinets as required by type and size of cabinet and trim style.

B. Install fire-protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights acceptable to authorities having jurisdiction.

C. Fire-Protection Cabinets: Fasten cabinets to structure, square and plumb.

D. Identification: Apply paint at locations indicated.

E. Adjust fire-protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

END OF SECTION 10 4413
SECTION 10 4416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 SUMMARY
   A. Section includes portable, hand-carried fire extinguishers and mounting brackets for fire extinguishers.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.

1.3 INFORMATIONAL SUBMITTALS
   A. Warranty: Sample of special warranty.

1.4 CLOSEOUT SUBMITTALS
   A. Operation and maintenance data.

1.5 COORDINATION
   A. Coordinate type and capacity of fire extinguishers with fire-protection cabinets to ensure fit and function.

1.6 WARRANTY
   A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace fire extinguishers that fail in materials or workmanship within specified warranty period.
      1. Warranty Period: Minimum Three (3) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS
   A. NFPA Compliance: Fabricate and label fire extinguishers to comply with NFPA 10, "Portable Fire Extinguishers."
   B. Fire Extinguishers: Listed and labeled for type, rating, and classification by an independent testing agency acceptable to authorities having jurisdiction.

2.2 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS
   A. Fire Extinguishers: Type, size, and capacity for each fire-protection cabinet and mounting bracket indicated.
1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. [Badger Fire Protection](#).
   b. [Kidde Residential and Commercial Division](#).
   c. [Pyro-Chem; Tyco Fire Suppression & Building Products](#).

2. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B, and bar coding for documenting fire-extinguisher location, inspections, maintenance, and recharging.

   B. Multipurpose Dry-Chemical Type: UL-rated 2-A:10-B:C, 14-lb (6.4-kg) nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

### 2.3 MOUNTING BRACKETS

A. Mounting Brackets: Manufacturer's standard galvanized steel, designed to secure fire extinguisher to wall or structure, of sizes required for types and capacities of fire extinguishers indicated, with plated or red baked-enamel finish.

1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. [Badger Fire Protection](#).

B. Identification: Lettering complying with authorities having jurisdiction for letter style, size, spacing, and location. Locate as indicated by Architect.

1. Identify bracket-mounted fire extinguishers with the words "FIRE EXTINGUISHER" in red letter decals applied to mounting surface.

### PART 3 - EXECUTION

#### 3.1 INSTALLATION

A. Examine fire extinguishers for proper charging and tagging.
   1. Remove and replace damaged, defective, or undercharged fire extinguishers.

B. Install fire extinguishers in locations indicated and in compliance with requirements of authorities having jurisdiction.
   1. Mounting Brackets: **54 inches (1372 mm)** above finished floor to top of fire extinguisher.

C. Mounting Brackets: Fasten mounting brackets to surfaces, square and plumb, at locations indicated.

**END OF SECTION 10 4416**
SECTION 10 5500.13 - USPS-DELIVERY POSTAL SPECIALTIES

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Mail receptacles.
      2. Cluster box units.
      3. Parcel lockers.
      4. Collection boxes.
      5. Accessories.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product.
   B. Shop Drawings: For postal specialties. Include plans, elevations, sections, and attachment details.
   C. Samples: For each type of exposed finish.

1.3 INFORMATIONAL SUBMITTALS
   A. Sample warranty.

1.4 DELIVERY, STORAGE, AND HANDLING
   A. Furnish lock keys according to USPS requirements; with temporary identification for their respective locks, bagged, and securely taped inside the collection compartment for shipping.

1.5 WARRANTY
   A. Special Warranty: Manufacturer agrees to repair or replace components of postal specialties that fail in materials or workmanship within specified warranty period.
      1. Warranty Period: Five (5) years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MAIL RECEPCTABLES
   A. Front-Loading Mail Receptacles: USPS-STD-4C; consisting of multiple compartments with fixed, solid compartment backs, enclosed within a recessed wall box.
1. **Manufacturers:** Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
   a. **2B Global Inc.**
   b. **AF Florence Manufacturing Company; Gibraltar Industries.**
   c. **Jensen Mailboxes; Architectural Building Products Division of Steel Craft Corporation.**
   d. **Postal Products Unlimited, Inc.**

2. Front-Loading Master Door: Fabricated from extruded aluminum and braced and framed to hold compartment doors; prepared to receive master-door lock.
   a. Master-Door Lock: Door prepared to receive lock provided by local postmaster.

3. Compartments: [Number and size as follows:]
   a. Type VI (No Parcel-Locker Compartment): A group of mail receptacles in single-column configuration with single master door, 9 mail compartments not less than 3 inches high by 12 inches wide by 15 inches deep and one outgoing mail collection compartment prepared for master-door lock.

4. Compartment Doors: Fabricated from extruded aluminum. Equip each with lock and tenant identification as required by USPS-STD-4C. Provide mail slot in the compartment with master-door lock.
   a. Compartment-Door Locks: USPS-L-1172C; with three keys for each compartment door.

5. Frames: Extruded aluminum or aluminum sheet; ganged and nested units, with cardholder and blank cards for tenant's identification within each compartment.

6. Concealed Components and Mounting Frames: Aluminum or steel sheet.

7. Exposed Aluminum Finish:
   a. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.

8. Aluminum Finish:
   a. Baked-Enamel or Powder-Coated Finish: Color as selected by Architect from manufacturer's full range.

2.2 **COLLECTION BOXES**

A. Collection Boxes: Consisting of single compartment with fire-resistant cushion bottom, enclosed within wall box, with mail slot to receive mail. Provide door for collecting mail from front of unit.
   1. Height: Sized to match height of four mail receptacles.
   2. Front-Loading Compartment Doors and Frames: Fabricated from 1/4-inch-thick aluminum, with opening not less than 12 by 20 inches and not more than 18 by 30 inches. Equip door with lock and concealed, full-length, flush hinge on one side.
a. Door Lock: Door prepared to receive lock provided by local postmaster.
b. Identification: Engrave face of compartment door with 1-inch-high letters as follows: "U.S. MAIL LETTER BOX" on two lines at top or bottom of unit.
c. Door Style: Extend door full width and height of unit, with no exposed frame.

3. Mail Slot: Fabricated from 1/4-inch-thick aluminum, with 11-inch-wide by 1-1/4-inch-high opening, protected by inside hood and hinge flap, and with inside baffle to prevent removal of mail from box.

4. Exposed Materials:

5. Concealed Components and Mounting Frames: Aluminum or steel sheet.

6. Schedule-Card Holder: Recessed or surface-mounted holder for pickup schedule card in center of bottom front portion of unit. Same material and finish as front of unit.

2.3 ACCESSORIES

A. Key Keeper: Consisting of single compartment with door; interior compartment size not less than 4-3/4 inches wide by 2-1/4 inches high by 1-1/2 inches deep USPS approved.
   1. Style: Compartment door extending full width and height of unit, with no exposed frame.
   2. Type of Operation: Loose key in box
   3. Door Lock: Door prepared to receive lock furnished by local postmaster.
   4. Exposed Materials:

2.4 FABRICATION

A. Form postal specialties to required shapes and sizes, with true lines and angles, square, rigid, and without warp, and with metal faces flat and free of dents or distortion. Make exposed metal edges and corners free of sharp edges and burrs and safe to touch. Fabricate doors of postal specialties to preclude binding, warping, or misalignment.

B. Preassemble postal specialties in shop to greatest extent possible to minimize field assembly.

C. Where dissimilar metals contact each other, protect against galvanic action by painting contact surfaces with bituminous coating or by applying other permanent separation as recommended by manufacturers of dissimilar metals.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Mail Receptacles: Install mail receptacles with center of tenant-door lock cylinders and bottom of compartments at the maximum and minimum heights above finished floor established by the USPS and manufacturer's written instructions.
B. Pedestal-Mounted Postal Specialties: Anchor units with 1/2-inch- diameter, stainless-steel anchor bolts with hooked ends.

C. Collection Boxes: Install collection boxes with centerline of mail slots not more than 48 inches above finished floor.

3.2 FIELD QUALITY CONTROL

A. Arrange for USPS personnel to examine and test postal specialties served by the USPS after they have been installed according to USPS regulations.

END OF SECTION 10 5500.13
SECTION 11 1200 - PARKING CONTROL EQUIPMENT

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      1. Automatic barrier slide gate.
      2. Pre-wired gate operator for slide gates, including all selected attachments, accessory equipment, and mounting brackets.
      3. Vehicle detectors.
      4. Exit terminals.

1.2 PREINSTALLATION MEETINGS
   A. Preinstallation Conference: Conduct conference at Project Site.

1.3 ACTION SUBMITTALS
   A. Product data.
   B. Shop Drawings: Submit drawings showing connections to adjacent construction, range of travel, and all electrical and mechanical connections to the operator. All underground runs of electrical lines and inductive vehicle obstruction loop locations shall be indicated on drawings. Drawings shall also show the size and location of the concrete mounting pad for parking control equipment.
      1. Include plans, elevations, sections, details, and attachments to other work.
      2. Detail equipment assemblies and indicate dimensions, weights, loads, required clearances, method of field assembly, components, and location and size of each field connection.
      3. Include diagrams for power, signal, and control wiring.

1.4 INFORMATIONAL SUBMITTALS
   A. Field quality-control reports.
   B. Installation instructions: Submit two copies of manufacturer's installation instructions for this specific project.
   C. Test reports: Submit affidavits from the manufacturer demonstrating that the gate operator mechanism has been tested to 200,000 cycles without breakdown.

1.5 CLOSEOUT SUBMITTALS
   A. Operation and Maintenance Data: For parking control equipment to include in emergency, operation, and maintenance manuals.
B. Software and Firmware Operational Documentation:
   1. Device address list.
   2. Printout of software application and graphic screens.

1.6 WARRANTY
A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace parking control equipment that fails in materials or workmanship within specified warranty period.
   1. Warranty Period: five (5) year(s) from date of Substantial Completion.

1.7 QUALITY ASSURANCE
A. Manufacturer: A company specializing in the manufacture of gate operators with a minimum of five years experience manufacturing gate operators of this type and design.
B. Installer: An authorized representative who is trained and approved by manufacturer with a minimum of three years experience installing similar equipment.

1.8 CODES AND REGULATORY REQUIREMENTS
A. Operators shall be built to UL 325 standards and be listed by a nationally recognized testing laboratory. Complete all electrical work according to local codes and National Electrical code. All fieldwork shall be performed in a neat and professional manner, completed to journeyman standards.
B. Current safety standards require the use of multiple external sensors to be capable of reversing the gate in either direction upon sensing an obstruction.
C. Gate must have physical stops to prevent over travel in both the open and close directions.

PART 2 - PRODUCTS

2.1 AUTOMATIC BARRIER GATES
A. General: Provide parking control device consisting of operator and controller housed in a weathertight, tamper-resistant cabinet enclosure with chain drive. Device shall be activated by a signal from access control device. Fabricate unit with gate-arm height in down position of not more than 35 inches (889 mm) above pavement.
   1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:
B. Standards: ASTM F 2200 for barrier gates and gate operators that are listed and labeled according to UL 325 by a qualified testing agency.
C. Gate operators (Basis of Design): HySecurity gate operator model SlideSmart DC 15 with Smart DC Controller. Other comparable UPS equipped operator, as approved by the architect.
D. Operation: Operation shall be by means of a brushed DC electric motor driving a single reduction gear reducer with an output sprocket driving #40 plated roller chain. When the gate is stopped, the motor applies a brake to the drive assembly which inhibits any forced, manual operation of the gate. Gate position is constantly monitored allowing for automatic reposition if motion is detected without the operator receiving a run command. The opening and closing speeds are user adjustable 0.75, 1.0, or 1.25 fps. The gear reducer shall be filled with synthetic lubricant capable of allowing operation down to -25°C (-13°F) without a heater. Operator shall be capable of handling gates up to 40ft (12m) in length and weighing up to 1,500lb (685kg). Gate Operator shall operate in the event of a power failure in an uninterruptible power supply mode to the extent the two 8Ah batteries can maintain adequate power.

E. Standard mechanical components shall include as a minimum:
1. Two piece linear low density polyethylene cover with top locking latch. Cover protects bystanders from pinch hazards of roller chain traveling through idlers and drive sprocket.
2. Frame to be constructed of 10ga or greater steel plate, welded.
3. Finish: Frame to be zinc plated. Other components zinc plated or non-corroding.
4. Operator shall contain a position sensing device and a means of setting the limit position and maintaining this position in non-volatile memory. Operator must also contain a magnetic absolute position sensor to verify the gate position.
5. Zinc or nickel plated #40 roller chain with chain mount brackets and connecting hardware.

F. Minimum standard electrical components: Industrial grade.
1. Motor: ½ HP brushed DC motor with ball bearings.
2. Electronic circuit boards to be conformal coated to resist moisture induced failures.
3. All components shall have overload protection.
4. Controls: Smart DC Controller Board with 512K memory containing:
   a. Adaptive inherent entrapment sensor;
   b. built in “warn before operate” system;
   c. built in timer to close;
   d. 32 character LCD, 5 button user interface;
   e. 24 programmable output relay options;
   f. anti-tailgate mode;
   g. built-in multi-level power surge and lightning strike protection using gas discharge and optoisolation technology;
   h. multi-stage intelligent battery charging under microprocessor control;
   i. capable of viewing EEPROM stored event logs for troubleshooting diagnostics;
   j. RS232 and USB port for connection to laptop or other computer peripheral and RS485 connection of Master/Slave systems.
k. Pulse width modulated control of brushed DC motor using 110 Amp rated solid state switching devices.

5. Transformer: 250 VA


7. Accessory power: 12VDC, 24VDC, 24VAC.

G. Stop switch, accessible from outside.

H. Back Drivable: During AC and DC power loss, the gate can be pushed open.

I. Required external sensors: See 1.05B. Specify photo eyes or gate edges or a combination thereof to be installed such that the gate is capable of reversing in either direction upon sensing an obstruction.

J. Optional control devices: card reader, vehicle detectors.

K. Optional alert devices: rotating beacon or flashing lights.

L. Other options (choose one or more of the following):
   1. Extended battery backup using two 50 Amp hour batteries with base riser.
   2. Base riser.
   3. Post mount bracket.

2.2 FACTORY TESTING

A. Fully assemble and test, at the factory, each gate operator to assure smooth operation and electrical connection integrity. Tests shall verify correct function of all inputs and functions.

B. Check all mechanical connections for tightness and alignment. Check all welds for completeness and continuity. Check welded corners and edges to assure they are square and straight.

C. Inspect zinc finish for completeness. Touch up any imperfections prior to shipment.

D. Check all electrical wires to assure that chafing cannot occur during shipping or operation.

PART 3 - EXECUTION

3.1 SITE EXAMINATION

A. Locate concrete mounting pad in accordance with approved shop drawings.

B. Make sure that gate is operating smoothly under manual conditions before installation of gate operators. Do not proceed until gate panel is aligned and operates without binding.

3.2 INSTALLATION

A. Install gate operator in accordance with the manufacturers printed instructions, current at the time of installation. Coordinate locations of operators with contract drawings; other trades and shop drawings.
B. Installer shall insure that the service to the operator is at least 15 AMPS. Electrical wiring to conform to NEC and manufacturer’s installation instructions. Operator wattage is 500W.

C. Vehicle Loop Detectors: Cut grooves in pavement and bury and seal wire loop at locations indicated on Drawings according to manufacturer's written instructions. Connect to parking control equipment operated by detector.

D. Ground equipment according to Section 26 0526 "Grounding and Bonding for Electrical Systems."

3.3 FIELD QUALITY CONTROL

A. Test gate operators through ten full cycles and adjust for operation without binding, scraping or uneven motion.

B. All anchor bolts shall be fully concealed in the finished installation.

C. Owner, or owner’s representative, shall complete “punch list” with installing contractor prior to final acceptance of the installation and submit completed warranty documentation to manufacturer.

3.4 CONTINUED SERVICE AND DOCUMENTATION

A. Train owner’s personnel on how to safely shut off electrical power, release and manually operate the gate. Additionally, demonstrate the general maintenance of the gate operator and accessories and provide copy of “Installation and Maintenance Manual” for the owner. Manual will identify parts of the equipment for future procurement.

END OF SECTION 11 1200
SECTION 11 3100 - RESIDENTIAL APPLIANCES

PART 1 - GENERAL

1.1 SUMMARY
   A. Section Includes:
      2. Kitchen exhaust ventilation.

1.2 ACTION SUBMITTALS
   A. Product Data: For each type of product indicated.
   B. LEED Submittals:
      1. Product Data for: Appliances indicated, documentation that products are ENERGY STAR compliant with indicated kWh per year for refrigerator and efficiency factor (EF) for dishwasher.
      2. Product Data for: Water-efficient clothes washer, documentation indicating modified energy factor and water factor.
   C. Samples: For each exposed product and for each color and texture.

1.3 INFORMATIONAL SUBMITTALS
   A. Product certificates.
   B. Field quality-control reports.
   C. Warranties: Sample of special warranties.

1.4 CLOSEOUT SUBMITTALS
   A. Operation and maintenance data.

1.5 QUALITY ASSURANCE
   A. Installer Qualifications: An employer of workers trained and approved by manufacturer for installation and maintenance of units required for this Project.
   B. Pre-installation Conference: Conduct conference at project site located at 4100 Silver Avenue SE, Albuquerque, NM job trailer.
1.6 WARRANTY
A. Special Warranties: Manufacturer's standard form in which manufacturer agrees to repair or replace residential appliances or components that fail in materials or workmanship within specified warranty period.
   1. Warranty Period: one year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS
A. Manufacturer's: The Basis-of-Design Product shall be General Electric with both Whirlpool and Frigidaire as acceptable alternatives. Products will be evaluated on ENERGY STAR compliance, meeting required efficiency requirements, grade of stainless steel finish, cost, etc.

2.2 COOKTOPS

2.3 RANGES
A. Electric Range: Freestanding Slide-in range with one oven and complying with AHAM ER-1.
   1. Basis-of-Design Product: General Electric
   2. Electric Burner Elements: four (4) heating elements, 5.3 cu. ft. oven, 9 ½” dual element, self-cleaning and delay bake option.
   3. Anti-Tip Device: Manufacturer's standard.

2.4 KITCHEN EXHAUST VENTILATION/MICROWAVE
A. Overhead Exhaust Hood/microwave
   1. Basis-of-Design Product: General Electric
   2. Type: Wall-mounted, combo exhaust-hood/microwave system.
   3. Exhaust Fan: Built into hood and with manufacturer's standard capacity.
      a. Venting: Vented to outside through wall
      b. 100 CFM tested in the field or better

2.5 REFRIGERATOR/FREEZERS (typical at residential units unless otherwise noted)
A. Refrigerator/Freezer: Two-door, refrigerator/freezer with freezer on top and complying with AHAM HRF-1.
   1. Basis-of-Design Product: General Electric
   2. Type: Freestanding
3. Storage Capacity:
   b. Fresh Food Capacity: 14.9 cu. ft.
   c. Freezer Volume: 6 cu. ft.
4. General Features:
   a. Interior light in refrigeration compartment.
   b. Frost Free.
   c. Interior light in freezer compartment.
   d. storage bin in freezer.
5. Energy Performance, ENERGY STAR: ENERGY STAR compliant, up to 425 kWh per year
6. Front Panel(s): Stainless steel.

2.6 REFRIGERATOR/FREEZERS (4th floor north and two bed units only-total of 9)
A. Refrigerator/Freezer: Two-door, side-by-side refrigerator/freezer and complying with AHAM HRF-1.
   1. Basis-of-Design Product: General Electric
   2. Type: Freestanding
   3. Storage Capacity:
      a. Refrigeration Total Capacity: 26 cu. ft.
      b. Fresh Food Capacity: 16.5 cu. ft.
      c. Freezer Volume: 9.5 cu. ft.
   4. General Features:
      a. Interior light in refrigeration compartment.
      b. Frost Free.
      c. Interior light in freezer compartment.
      d. Automatic icemaker and storage bin in freezer.
   5. Energy Performance, ENERGY STAR: ENERGY STAR compliant, up to 425 kWh per year
   6. Front Panel(s): Stainless steel.

2.7 DISHWASHERS
A. Dishwasher: Complying with AHAM DW-1 and ASSE 1006.
   2. Type: Built-in undercounter.
3. Energy Performance, ENERGY STAR: Provide appliances that qualify for the EPA/DOE ENERGY STAR product labeling program. ENERGY STAR compliant, EF 0.46 min


2.8 CLOTHES WASHERS AND DRYERS

A. All clothes washers and dryers to be Owner Furnished Contractor Installed.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Built-in Equipment: Securely anchor units to supporting cabinets or countertops with concealed fasteners. Verify that clearances are adequate for proper functioning and that rough openings are completely concealed.

B. Freestanding Equipment: Place units in final locations after finishes have been completed in each area. Verify that clearances are adequate to properly operate equipment.

C. Range Anti-Tip Device: Install at each range according to manufacturer's written instructions.

D. Utilities: Comply with plumbing and electrical requirements.

3.2 FIELD QUALITY CONTROL

A. Tests and Inspections:

1. Perform visual, mechanical, and electrical inspection and testing for each appliance according to manufacturers' written recommendations. Certify compliance with each manufacturer's appliance-performance parameters.

2. Leak Test: After installation, test for leaks. Repair leaks and retest until no leaks exist.

3. Operational Test: After installation, start units to confirm proper operation.

4. Test and adjust controls and safeties. Replace damaged and malfunctioning controls and components.

B. Prepare test and inspection reports.

END OF SECTION 11 3100
SECTION 12 3661 - SIMULATED STONE COUNTERTOPS

PART 1 - GENERAL

1.1 SUMMARY
A. Section Includes:
   1. Engineered stone countertops and backsplash in bathroom (not kitchen).

1.2 ACTION SUBMITTALS
A. Product Data: For countertop materials.
B. LEED Submittals:
   1. Product Data for adhesives, documentation indicating that product contains no urea formaldehyde.
   2. Product Data for recycled content
C. Shop Drawings: For countertops. Show materials, finishes, edge and backsplash profiles, methods of joining, and cutouts for plumbing fixtures.
D. Samples: For each type of material exposed to view.

PART 2 - PRODUCTS

2.1 ENGINEERED STONE COUNTERTOPS
A. Configuration: Provide countertops with the following front and backsplash style:
   1. Front: Straight, slightly eased at top
   2. Backsplash: Straight, slightly eased at corner at bathroom only
B. Countertops: 3 cm thick, quartz agglomerate.
C. Backsplashes: 3 cm thick, quartz agglomerate.

2.2 COUNTERTOP MATERIALS
A. Quartz Agglomerate: Solid sheets consisting of quartz aggregates bound together with a matrix of filled plastic resin and complying with the "Physical Characteristics of Materials" Article of ANSI SS1.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide Radianz Sechura Mocha SM499 countertops by Samsung Chemical USA, Inc. or comparable product by one of the following:
      a. Cambria.
b. LG Chemical, Ltd.

2. Colors and Patterns: As selected by Architect from Manufacturer’s full line.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Fasten countertops by screwing through corner blocks of base units into underside of countertop. Align adjacent surfaces and, using adhesive in color to match countertop, form seams to comply with manufacturer's written instructions. Carefully dress joints smooth, remove surface scratches, and clean entire surface.

END OF SECTION 12 3661
SECTION 14 2400 - HYDRAULIC ELEVATORS

PART 1 - GENERAL

1.1 SUMMARY
A. Section includes hydraulic passenger elevators.

1.2 ACTION SUBMITTALS
A. Product Data: Include capacities, sizes, performances, operations, safety features, finishes, and similar information.
B. Shop Drawings:
   1. Include plans, elevations, sections, and large-scale details indicating service at each landing, machine room layout, coordination with building structure, relationships with other construction, and locations of equipment.
   2. Indicate maximum dynamic and static loads imposed on building structure at points of support, and maximum and average power demands.
C. Samples: For exposed finishes.

1.3 INFORMATIONAL SUBMITTALS
A. Seismic Qualification Certificates: For elevator equipment, accessories, and components, from manufacturer.
B. Manufacturer Certificates: Signed by elevator manufacturer certifying that hoistway, pit, and machine room layout and dimensions, as shown on Drawings, and electrical service, as shown and specified, are adequate for elevator system being provided.

1.4 CLOSEOUT SUBMITTALS
A. Operation and Maintenance Data: For elevators to include in emergency, operation, and maintenance manuals.
B. Inspection and Acceptance Certificates and Operating Permits: As required by authorities having jurisdiction for normal, unrestricted elevator use.
C. Continuing Maintenance Proposal: Submit a continuing maintenance proposal from Installer to Owner, in the form of a standard five (5) year maintenance agreement, starting on date initial maintenance service is concluded. State services, obligations, conditions, and terms for agreement period and for future renewal options.

1.5 WARRANTY
A. Manufacturer's Special Warranty: Manufacturer agrees to repair, restore, or replace elevator work that fails in materials or workmanship within specified warranty period.
   1. Warranty Period: One (1) year from date of Substantial Completion.
PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. **Basis-of-Design Product:** Endura 35A Twinpost Telescopic Hydraulic Elevator by ThyssenKrupp. Subject to compliance with requirements, provide product indicated on Drawings or comparable product by one of the following:

1. KONE Inc.
2. Otis Elevator Co.
3. ThyssenKrupp Elevator.

2.2 PERFORMANCE REQUIREMENTS

A. Regulatory Requirements: Comply with ASME A17.1/CSA B44.

B. Accessibility Requirements: Comply with Section 407 in the U.S. Architectural & Transportation Barriers Compliance Board's ADA-ABA Accessibility Guidelines and with ICC A117.1.

C. Seismic Performance: Elevator system shall withstand the effects of earthquake motions determined according to ASCE/SEI 7 and shall comply with elevator safety requirements for seismic risk Zone 2 or greater in ASME A17.1/CSA B44.

1. Project's Seismic Design Category: B

2.3 ELEVATORS

A. Elevator System, General: Manufacturer's standard elevator systems. Unless otherwise indicated, manufacturers' standard components shall be used, as included in standard elevator systems and as required for complete system.

B. Elevator Description:

1. Type: Holeless, beside-the-car, telescoping, dual cylinder.
2. Rated Load: 3,500 lbs
3. Rated Speed: 125 FPM
4. Operation System: Selective-collective automatic
5. Car Enclosures:
   a. Inside Width: 6’-8”
   b. Inside Depth: 5’-5” from back wall to front wall (return panels).
   c. Inside Height: 7’-4” to underside of ceiling.
   d. Front Walls (Return Panels): Satin stainless steel, No. 4 finish with integral car door frames.
   e. Car Fixtures: Satin stainless steel, No. 4 finish.
f. Side and Rear Wall Panels: Powder Coated – color selected by Architect from Manufacturer’s complete range.

g. Reveals: Polished stainless steel, No. 8 finish.

h. Door Faces (Interior): Powder Coated – color selected by Architect from Manufacturer’s complete range.

i. Ceiling: Powder Coated – color selected by Architect from Manufacturer’s complete range.

j. Handrails: 1/2 by 2 inches (13 by 50 mm) rectangular satin stainless steel, No. 4 finish, at sides of car.

k. Floor prepared to receive resilient flooring (specified in Section 09 6500 “Resilient Flooring”).

6. Hoistway Entrances:
   a. Width: 3’-6”
   b. Height: 7’-0”
   c. Type: Single-speed side sliding
   d. Frames at all floors: Satin stainless steel, No. 4 finish.
   e. Doors at all floors: Satin stainless steel, No. 4 finish.

7. Hall Fixtures at all floors: Satin stainless steel, No. 4 finish.

8. Additional Requirements:
   a. Provide inspection certificate in each car, mounted under acrylic cover with frame made from Satin stainless steel, No. 4 finish.
   b. Provide hooks for protective pads and one (1) complete set(s) of full-height protective pads.

2.4 SYSTEMS AND COMPONENTS

A. Pump Units: Positive-displacement type with a maximum of 10 percent variation between no load and full load and with minimum pulsations.
   1. Pump shall be submersible type with submersible squirrel-cage induction motor, and shall be suspended inside oil tank from vibration isolation mounts.
   2. Motor shall have solid state starting.

B. Hydraulic Silencers: System shall have hydraulic silencer containing pulsation-absorbing material in blowout-proof housing at pump unit.

C. Hydraulic Fluid: USDA certified biobased product, ultra low toxicity, readily biodegradable, energy efficient, high performing, made from canola oil with antioxidant, anticorrosive, antifoaming, and metal-passivating additives. Hydraulic fluid is approved by elevator manufacture for use with elevator equipment.
   1. USDA certified biobased product; >90% bio-based content, per ASTM D6866
   2. Classified “Readily” biodegradable, per OECD 301B
3. >70% Biodegradability, per ASTM D5864
4. >20,000 ppm Aquatic toxicity, per EPA-821-R-02-012
5. >220 Viscosity Index, ASTM D2270
6. 25 Viscosity at 40 degree C, cSt, per ASTM D445
7. >220 degree C, Flash Point, per ASTM D93

D. Guides: Roller guides; polymer-coated, nonlubricated sliding guides; or sliding guides with guide-rail lubricators. Provide guides at top and bottom of car and counterweight frames.

2.5 OPERATION SYSTEMS

A. General: Provide manufacturer's standard microprocessor operation system as required to provide type of operation indicated.

B. Auxiliary Operations: In addition to primary operation system features, provide the following operational features for elevators where indicated:
   1. Single-Car Battery-Powered Lowering: When power fails, car is lowered to the lowest floor, opens its doors, and shuts down. System includes rechargeable battery and automatic recharging system.
   2. Independent Service: Keyswitch in car-control station removes car from group operation and allows it to respond only to car calls.

2.6 DOOR REOPENING DEVICES

A. Infrared Array: Provide door reopening device with uniform array of 36 or more microprocessor-controlled, infrared light beams projecting across car entrance. Interruption of one or more light beams shall cause doors to stop and reopen.

B. Nudging Feature: After car doors are prevented from closing for predetermined adjustable time, through activating door reopening device, a loud buzzer shall sound and doors shall begin to close at reduced kinetic energy.

2.7 CAR ENCLOSURES

A. General: Provide steel-framed car enclosures with nonremovable wall panels, with removable car roof, access doors, power door operators, and ventilation.

B. Materials and Finishes: Manufacturer's standards, but not less than the following:
   1. Stainless-Steel Wall Panels: Flush, hollow-metal construction; fabricated from stainless-steel sheet.
   2. Stainless-Steel Doors: Flush, hollow-metal construction; fabricated by laminating stainless-steel sheet to exposed faces and edges of enameled cold-rolled steel doors using adhesive that fully bonds metal to metal without telegraphing or oil-canning.
   4. Sills: Extruded aluminum, with grooved surface, 1/4 inch (6.4 mm) thick.
   5. Metal Ceiling: Flush panels, with four low-voltage downlights in each panel.
6. **Handrails:** Manufacturer's standard handrails, of shape, metal, and finish indicated.

2.8 **HOISTWAY ENTRANCES**

A. **Hoistway Entrance Assemblies:** Manufacturer's standard horizontal-sliding, door-and-frame hoistway entrances complete with track systems, hardware, sills, and accessories. Frame size and profile shall accommodate hoistway wall construction.

1. Where gypsum board wall construction is indicated, frames shall be self-supporting with reinforced head sections.

B. **Fire-Rated Hoistway Entrance Assemblies:** Door and frame assemblies shall comply with NFPA 80 and be listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction based on testing at as close-to-neutral pressure as possible according to NFPA 252 or UL 10B.

1. **Fire-Protection Rating:** 1-1/2 hours with 30-minute temperature rise of 450 deg F (250 deg C).

C. **Materials and Fabrication:** Manufacturer's standards, but not less than the following:

1. **Stainless-Steel Frames:** Formed from stainless-steel sheet.
2. **Star of Life Symbol:** Identify emergency elevators with star of life symbol, not less than 3 inches (76 mm) high, on both inside surfaces of hoistway door frames.
3. **Stainless-Steel Doors:** Flush, hollow-metal construction; fabricated from stainless-steel sheet.
4. **Sight Guards:** Provide sight guards on doors matching door edges.
5. **Sills:** Extruded aluminum, with grooved surface, 1/4 inch (6.4 mm) thick.
6. **Nonshrink, Nonmetallic Grout:** Factory-packaged, nonstaining, noncorrosive, nongaseous grout complying with ASTM C 1107/C 1107M.

2.9 **SIGNAL EQUIPMENT**

A. **General:** Provide hall-call and car-call buttons that light when activated and remain lit until call has been fulfilled. Fabricate lighted elements with LED bulbs.

B. **Car-Control Stations:** Provide manufacturer's standard car-control stations. Mount in return panel adjacent to car door unless otherwise indicated.

1. Provide "No Smoking" sign matching car-control station, with text and graphics as required by authorities having jurisdiction.

C. **Emergency Communication System:** Two-way voice communication system, with visible signal, which dials preprogrammed number of monitoring station and does not require handset use. System is contained in flush-mounted cabinet, with identification, instructions for use, and battery backup power supply.

D. **Car Position Indicator:** Provide digital-type car position indicator, located above car door or above car-control station. Also, provide audible signal to indicate to passengers that car is either stopping at or passing each of the floors served. Include travel direction arrows if not provided in car-control station.
E. Column Mounted Car Riding Lantern: A car riding lantern shall be installed in the elevator cab and located in the entrance. The lantern, when illuminated, will indicate the intended direction of travel. The lantern will illuminate and a signal will sound when the car arrives at a floor where it will stop. The lantern shall remain illuminated until the door(s) begin to close.

F. Hall Push-Button Stations: Provide hall push-button station at each landing as indicated.

G. Emergency Pictorial Signs: Fabricate from materials matching hall push-button stations, with text and graphics as required by authorities having jurisdiction. Provide one sign at each hall push-button station unless otherwise indicated.

2.10 FINISH MATERIALS
A. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 441.
B. Stainless-Steel Bars: ASTM A 276, Type 441.
C. Stainless-Steel Tubing: ASTM A 554, Grade MT 441.
D. Aluminum Extrusions: ASTM B 221 (ASTM B 221M), Alloy 6063.

PART 3 - EXECUTION

3.1 INSTALLATION
A. Sound Isolation: Mount rotating and vibrating equipment on vibration-isolating mounts to minimize vibration transmission to structure and structure-borne noise due to elevator system.
B. Lubricate operating parts of systems as recommended by manufacturers.
C. Leveling Tolerance: 1/4 inch (6 mm), up or down, regardless of load and travel direction.
D. Set sills flush with finished floor surface at landing. Fill space under sill solidly with nonshrink, nonmetallic grout.
E. Locate hall signal equipment for elevators as follows, unless otherwise indicated:

3.2 FIELD QUALITY CONTROL
A. Acceptance Testing: On completion of elevator installation and before permitting elevator use (either temporary or permanent), perform acceptance tests as required and recommended by ASME A17.1/CSA B44 and by governing regulations and agencies.

3.3 PROTECTION
A. Temporary Use: Do not use elevators for construction use.

3.4 DEMONSTRATION
A. Engage a factory-authorized service representative to train Owner's maintenance personnel to operate, adjust, and maintain elevator(s).
3.5 MAINTENANCE

A. Initial Maintenance Service: Beginning at Substantial Completion, maintenance service shall include twelve (12) months' full maintenance by skilled employees of elevator Installer. Include monthly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper elevator operation. Parts and supplies shall be manufacturer's authorized replacement parts and supplies.

END OF SECTION 14 2400
SECTION 21 0500 - COMMON WORK RESULTS FOR FIRE SUPPRESSION

PART 1 GENERAL

1.01 SECTION INCLUDES
A. Pipe, fittings, valves, and connections for sprinkler, standpipe and fire hose, and combination sprinkler and standpipe systems.

1.02 RELATED REQUIREMENTS
A. Section 21 1300 - Fire-Suppression Sprinkler Systems: Sprinkler systems design.
B. Section 21 1200 - Fire-Suppression Standpipes: Standpipe design.

1.03 REFERENCE STANDARDS
A. ASME (BPV IX) - Boiler and Pressure Vessel Code, Section IX - Welding and Brazing Qualifications; The American Society of Mechanical Engineers.
B. ASME B16.1 - Gray Iron Pipe Flanges and Flanged Fittings: Classes 25, 125, and 250; The American Society of Mechanical Engineers.
C. ASME B16.9 - Factory-made Wrought Steel Butt welding Fittings; The American Society of Mechanical Engineers.
D. ASME B16.18 - Cast Copper Alloy Solder Joint Pressure Fittings; The American Society of Mechanical Engineers; 2012 (ANSI B16.18).
L. AWS A5.8/A5.8M - Specification for Filler Metals for Brazing and Braze Welding; American Welding Society.
M. AWS D1.1/D1.1M - Structural Welding Code - Steel.
N. AWWA C105/A21.5 - Polyethylene Encasement for Ductile-Iron Pipe Systems; American Water Works Association; 2010 (ANSI/AWWA C105/A21.5).
Q. UL (FPED) - Fire Protection Equipment Directory; Underwriters Laboratories Inc..

1.04 SUBMITTALS
A. See Section 01 3000 - Administrative Requirements, for submittal procedures.
B. Shop Drawings: Indicate pipe materials used, jointing methods, supports, floor and wall penetration seals. Indicate installation, layout, weights, mounting and support details, and piping connections.
C. Project Record Documents: Record actual locations of components and tag numbering.
D. Operation and Maintenance Data: Include installation instructions and spare parts lists.

1.05 QUALITY ASSURANCE
A. Manufacturer Qualifications: Company specializing in manufacturing the Products specified in this section with minimum three years documented experience.
B. Conform to UL, FM, and Warnock Hersey requirements.
C. Valves: Bear UL label or marking. Provide manufacturer's name and pressure rating marked on valve body.

1.06 DELIVERY, STORAGE, AND HANDLING
A. Provide temporary end caps and closures on piping and fittings. Maintain in place until installation.

PART 2 PRODUCTS
2.01 FIRE PROTECTION SYSTEMS
A. Sprinkler Systems: Conform work to NFPA 13.
B. Standpipe and Hose Systems: Conform to NFPA 14.
C. Welding Materials and Procedures: Conform to ASME Code.

2.02 BURIED PIPING
A. Steel Pipe: ASTM A53/A53M Schedule 40 or ASTM A795 Standard Weight, black, with AWWA C105 polyethylene jacket, or double layer, half-lapped polyethylene tape.
   1. Steel Fittings: ASME B16.9, wrought steel, buttwelded; with double layer, half-lapped polyethylene tape.
   4. Casing: Closed glass cell insulation.
C. Jointing: Welded in accordance with AWS D1.1.
D. Casing: Closed glass cell insulation.

2.03 ABOVE GROUND PIPING
A. Steel Pipe: ASTM A795 Schedule 10 or ASTM A53 Schedule 40, black.
   2. Mechanical Grooved Couplings: Malleable iron housing clamps to engage and lock, "C" shaped elastomeric sealing gasket, steel bolts, nuts, and washers; galvanized for galvanized pipe.
   3. Mechanical Formed Fittings: Carbon steel housing with integral pipe stop and O-ring pocked and O-ring, uniformly compressed into permanent mechanical engagement onto pipe.
B. Copper Tube: ASTM B75 (ASTM B75M) or ASTM B88 (ASTM B88M), H58 drawn temper.
   1. Type: Type M (C).
   2. Fittings: ASME B16.1B, cast copper alloy solder joint, pressure type.
   3. Joints: AWS A5.8 Classification BCuP-3 or BCuP-4 copper/silver braze.
C. CPVC Pipe: ASTM F442/F442M, SDR 13.5.
   1. Fittings: ASTM F438 Schedule 40, or ASTM F439 schedule 80, CPVC.

END OF SECTION