PROJECT MANUAL

09.24.2026 Issued for Permit

LDA Project No. 2026.11

OhioCAT Compact Rental Store

490 Byers Road
Miamisburg, Ohio 45342

Ohio CAT

Ohio Machine Company

3993 E. Royalton Road
Broadview Height, Ohio 44147

LDA ARCHITECTS

The Offices at the Agora, 5000 Euclid Avenue, Suite 104
Cleveland, Ohio 44103

216.932.1890
www.LDAarchitecture.com

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SECTION 011000 - SUMMARY

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Project information.
2. General Contractor Requirements
3. Work covered by Contract Documents.
4. Access to site.
5. Work restrictions.
6. Specification and drawing conventions.
7. Miscellaneous provisions.

1.3 PROJECT INFORMATION

A. Project Identification: OhioCAT CAT Compact Rental Store

1. Project Location: 490 Byers Road, Miamisburg, OH 45342

B. Owner: Ohio Machine Company, 3993 E. Royalton Road, Broadview Heights, Ohio 44147

C. Architect: LDA architects, Inc., 5000 Euclid Avenue, Suite 104, Cleveland, Ohio 44103.

D. Architect's Consultants: The Architect has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. Mechanical, Electrical and Plumbing Engineers: TES Engineering 25760 First Street, Cleveland, OH 44245

2. Structural Engineers: Jezerinac Geers Structural Engineering

E. Other Owner Consultants: The Owner has retained the following design professionals who have prepared designated portions of the Contract Documents:

1. Civil Engineer: The Mannik & Smith Group, Inc. 20600 Chagrin Blvd, Suite 500 Shaker Heights, OH 44122

2. Fire Suppression Designer: TES Engineering 25760 First Street, Cleveland, OH 44245

1.4 GENERAL CONTRACTOR REQUIREMENTS

1. Work Included: The contract of this work shall include all the labor, materials, and permits necessary and incidentals to the complete construction, as indicated on the Drawings and Specifications.
2. The contractor shall maintain proper barricades and other protection for the public.
3. The General Contractor shall provide a field office, a full-time field superintendent acceptable to the Owner, and coordinate the mechanical, electrical trades and all other sub-trades as well as the installation of equipment purchased and installed by the Owner.
4. Building Layout: It shall be the responsibility of the General Contractor (or a qualified Civil Engineer who he has hired) to have the building laid out, establishing all lines and grades and maintaining a check on the same throughout construction. Mechanical and electrical contractors shall be responsible for maintaining all invert elevations in relation to finish floor elevations as set by this Contractor.
5. Guarantee and Waiver of Lien:
   a. All work shall be guaranteed for one year from date of acceptance, unless specifically required for a longer guarantee, during which time any imperfections or failure of products, which may develop in workmanship or materials shall be made good without cost to the Owner.
   b. When required for payment or closing out of contract, guarantees and waivers of liens shall be provided by contractors, subcontractor and materials suppliers.
6. Permits:
   a. The General Contractor shall be responsible for any and all permits.
   b. The General Contractor is also responsible to pay for any and all fees in connection with the required permits and permit applications.

7. Bonding & Licensing: The General and Sub-Contractors are required to comply with the local jurisdiction requirements for Bonding, Insurance and Licensing before commencement of any and all work

1.5 WORK COVERED BY CONTRACT DOCUMENTS

A. The Project Scope of Work is defined by the Contract Documents and consists of all work indicated in the full set of drawings, the project manual and any related codes or other regulations.

B. Type of Contract:

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

1.6 ACCESS TO SITE

A. General: Contractor shall have partial use of the Project site for construction operations, part of the site will be occupied during construction.

1.7 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 to normal business working hours to be approved by the owner, Monday through Friday, unless otherwise indicated.

1. Weekend/Holiday Hours: Work may not take place on weekends and holidays listed in the General Requirements of these documents.
2. Obtain Owner’s written approval in advance regarding requested work hours that may vary from the approved normal business working hours.

C. Existing Utility Interruptions: Do not interrupt utilities serving facilities occupied by Owner or 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.
2. Obtain Owner's written permission before proceeding with utility interruptions.

D. Noise, Vibration, and Odors: Coordinate operations that may result in high levels of noise and vibration, odors, with Owner.

1. Notify Architect and Owner not less than two days in advance of proposed disruptive operations.
2. Obtain Owner's written permission before proceeding with disruptive operations.

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

F. No Weapons or Firearms, concealed or otherwise are permitted on the site.

1.8 SPECIFICATION AND DRAWING CONVENTIONS

A. Specification Content: The Specifications use certain conventions for the style of language and the intended meaning of certain terms, words, and phrases when used in particular situations. These conventions are as follows:

1. Imperative mood and streamlined language are generally used in the Specifications. The words "shall," "shall be," or "shall comply with," depending on the context, are implied where a colon (:) is used within a sentence or phrase.

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

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

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

1. Terminology: Materials and products are identified by the typical generic terms used in the individual Specifications Sections.
2. Abbreviations: Materials and products are identified by abbreviations published as part of the U.S. National CAD Standard and scheduled on Drawings.
3. Keynoting: Materials and products are identified by reference keynotes.

1.9 Accessibility Requirements

A. NOTE THAT ALL ACCESSIBILITY REQUIREMENTS MUST BE MEET ABSOLUTELY, ANY INCORRECT IN PLACE CONSTRUCTION THAT IS NOT BUILT MEETING UFAS REQUIREMENTS IN THE CONTRACT DOCUMENTS WILL BE REBUILT TO MEET THE ANSI/ADA REQUIREMENTS AT THE EXPENSE OF THE CONTRACTOR.

1.10 Basis of Design

A. The intent of the plans and specifications is to provide performance-based requirements. Products indicated in the plans and specifications are a basis of design that meet the minimum requirements. A comparable product meeting or exceeding the performance requirements of the basis of design product is acceptable.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 011000

SECTION 012200 - UNIT PRICES

PART 1 - GENERAL

1.1 SUMMARY

A. Section includes administrative and procedural requirements for unit prices.

B. Related Requirements:

1. Division 01 Section "Contract Modification Procedures" for procedures for submitting and handling Change Orders.

1.2 DEFINITIONS

A. Unit price is an amount incorporated in the Agreement, applicable during the duration of the Work as a price per unit of measurement for materials, equipment, or services, or a portion of the Work, added to or deducted from the Contract Sum by appropriate modification, if the scope of Work or estimated quantities of Work required by the Contract Documents are increased or decreased.

1.3 PROCEDURES

A. Unit prices include all necessary material, plus cost for delivery, installation, insurance, applicable taxes, overhead, and profit.

B. Measurement and Payment: See individual Specification Sections for work that requires establishment of unit prices. Methods of measurement and payment for unit prices are specified in those Sections.

C. Owner reserves the right to reject Contractor's measurement of work-in-place that involves use of established unit prices and to have this work measured, at Owner's expense, by an independent surveyor acceptable to Contractor.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 012200

SECTION 012300 - ALTERNATES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for alternates.

1.3 DEFINITIONS

A. Alternate: An amount proposed by bidders and stated on the Bid Form for certain work defined in the bidding requirements that may be added to or deducted from the base bid amount if Owner decides to accept a corresponding change either in the amount of construction to be completed or in the products, materials, equipment, systems, or installation methods described in the Contract Documents.

1. The cost or credit for each alternate is the net addition to or deduction from the Contract Sum to incorporate alternate into the Work. No other adjustments are made to the Contract Sum.

1.4 PROCEDURES

A. Coordination: Revise or adjust affected adjacent work as necessary to completely integrate work of the alternate into Project.

1. Include as part of each alternate, miscellaneous devices, accessory objects, and similar items incidental to or required for a complete installation whether or not indicated as part of alternate.

B. Notification: Immediately following award of the Contract, notify each party involved, in writing, of the status of each alternate. Indicate if alternates have been accepted, rejected, or deferred for later consideration. Include a complete description of negotiated revisions to alternates.

C. Execute accepted alternates under the same conditions as other work of the Contract.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

PART 4 - END OF SECTION 012300

SECTION 012600 - CONTRACT MODIFICATION PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

1.3 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."

1.4 PROPOSAL REQUESTS

A. Architect/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 or Owner are not instructions either to stop work in progress or to execute the proposed change.
2. Within time specified in Proposal Request or 5 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 delivery charges, equipment rental, and amounts of trade discounts.
    c. Include costs of labor and supervision directly attributable to the change.
        1) Provide breakdown for labor (including labor rate) and materials.
    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 CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail." or forms acceptable to Architect.

B. Contractor-Initiated 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 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. Proposal Request Form: Use CSI Form 13.6A, "Change Order Request (Proposal)," with attachments CSI Form 13.6D, "Proposal Worksheet Summary," and Form 13.6C, "Proposal Worksheet Detail." or form acceptable to Architect.

1.5 ADMINISTRATIVE CHANGE ORDERS

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

B. Unit-Price Adjustment: See Division 01 Section "Unit Prices" for administrative procedures for preparation of Change Order Proposal for adjusting the Contract Sum to reflect measured scope of unit-price work.

1.6 CHANGE ORDER PROCEDURES

A. On Owner's approval of a Work Changes Proposal Request, Architect will issue a Change Order for signatures of Owner and Contractor.

1.7 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Work Change Directive: Architect or Owner may issue a Construction Work Change Directive on AIA Document G714 . Construction Work Change Directive instructs Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. Construction Work 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 Work 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 012600

SECTION 013100 - PROJECT MANAGEMENT AND COORDINATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative provisions for coordinating construction operations on Project including, but not limited to, the following:

1. General coordination procedures.
2. Coordination drawings.
3. Requests for Information (RFIs).
4. Project meetings.

B. Related Requirements:
1. Division 01 Section "Construction Progress Documentation" for preparing and submitting Contractor's construction schedule.
2. Division 01 Section "Execution" for procedures for coordinating general installation and field-engineering services, including establishment of benchmarks and control points.
3. Division 01 Section "Closeout Procedures" for coordinating closeout of the Contract.

1.3 DEFINITIONS

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

1.4 INFORMATIONAL SUBMITTALS

A. Subcontract List: Prepare a written summary identifying individuals or firms proposed for each portion of the Work, including those who are to furnish products or equipment fabricated to a special design.[Use CSI Form 1.5A.] 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.

B. Key Personnel Names: Within 15 days of starting construction operations, submit a list of key personnel assignments, including superintendent and other personnel in attendance at Project site. Identify individuals and their duties and responsibilities; list addresses and telephone numbers, including home, office, and cellular telephone numbers and e-mail addresses. Provide names, addresses, and telephone numbers of individuals assigned as alternates in the absence of individuals assigned to Project.

1. Post copies of list in project meeting room, in temporary field office, and by each temporary telephone. Keep list current at all times.

1.5 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.

B. Prepare memoranda for distribution to each party involved, outlining special procedures required for coordination. Include such items as required notices, reports, and list of attendees at meetings.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities and activities of other contractors to avoid conflicts and to ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Contractor's construction schedule.
2. Preparation of the schedule of values.
3. Installation and removal of temporary facilities and controls.
4. Delivery and processing of submittals.
5. Progress meetings.
6. Preinstallation conferences.
7. Project closeout activities.
8. Startup and adjustment of systems.

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials. Coordinate use of temporary utilities to minimize waste.

1.6 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.
6. RFI number, numbered sequentially.
7. RFI subject.
8. Specification Section number and title and related paragraphs, as appropriate.
9. Drawing number and detail references, as appropriate.
10. Field dimensions and conditions, as appropriate.
11. Contractor's suggested resolution. If Contractor's suggested resolution impacts the Contract Time or the Contract Sum, Contractor shall state impact in the RFI.
12. Contractor's signature.
13. Attachments: Include sketches, descriptions, measurements, photos, Product Data, Shop Drawings, coordination drawings, and other information necessary to fully describe items needing interpretation.

    a. Include dimensions, thicknesses, structural grid references, and details of affected materials, assemblies, and attachments on attached sketches.

C. RFI Forms: AIA Document G716 Software-generated form with substantially the same content as indicated above, acceptable to Architect.

1. Attachments shall be electronic files in Adobe Acrobat PDF format.

D. Architect's Action: Architect will review each RFI, determine action required, and respond. Allow seven 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 Contractor-generated RFIs will be returned without action:

    a. Requests for approval of submittals.
    b. Requests for approval of substitutions.
    c. Requests for approval of Contractor's means and methods.
    d. Requests for coordination information already indicated in the Contract Documents.
    e. Requests for adjustments in the Contract Time or the Contract Sum.
    f. Requests for interpretation of Architect's actions on submittals.
    g. 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 Division 01 Section "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 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 weekly . Use CSI Log Form 13.2B. or 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 returned without action or withdrawn.
5. RFI description.
6. Date the RFI was submitted.
7. Date Architect's response was received.

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

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

1.7 PROJECT MEETINGS

A. General: Meetings and conferences will be held at Project site unless otherwise indicated.

1. Attendees: Inform participants and others involved, and individuals whose presence is required, of date and time of each meeting. Notify Owner and Architect of scheduled meeting dates and times.
2. Agenda: Prepare the meeting agenda. Distribute the agenda to all invited attendees.
3. Minutes: Architect responsible for conducting meeting will record significant discussions and agreements achieved. Distribute the meeting minutes to everyone concerned, including Owner,Contractor, and Architect, within five days of the meeting.

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

1. Conduct the conference to review responsibilities and personnel assignments.

2. Attendees: Authorized representatives of Owner, Owner's EGCC 2011 Verifer & Rater, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the conference. Participants at the conference shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect progress, including the following:

    a. Tentative construction schedule.
    b. Critical work sequencing and long-lead items.
    c. Designation of key personnel and their duties.
    d. Lines of communications.
    e. Procedures for processing field decisions and Change Orders.
    f. Procedures for RFIs.
    g. Procedures for testing and inspecting.
    h. Procedures for processing Applications for Payment.
    i. Distribution of the Contract Documents.
    j. Submittal procedures.
    k. Enterprise Green Communities Criteria 2011 Sustainable design requirements.
    l. Preparation of record documents.
    m. Use of the premises.
    n. Work restrictions.
    o. Working hours.
    p. Owner's occupancy requirements.
    q. Responsibility for temporary facilities and controls.
    r. Procedures for moisture and mold control.
    s. Procedures for disruptions and shutdowns.
    t. Construction waste management and recycling.
    u. Parking availability.
    v. Office, work, and storage areas.
    w. Equipment deliveries and priorities.
    x. First aid.
    y. Security.
    z. Progress cleaning.

4. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

C. Enterprise Green Communities Criteria 2012 (EGCC 2011) Coordination Conference: Architect will schedule and conduct a EGCC 2011 coordination conference before starting construction, at a time convenient to Owner Architect, and Contractor.

1. Attendees: Authorized representatives of Owner, Owner's EGCC 2011 Verifer & Rater, 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 meeting requirements for EGCC 2011 certification, including the following:

a. EGCC 2011 Worksheet/Project Checklist.
b. General requirements for EGCC 2011-related procurement and documentation.
c. Project closeout requirements and EGCC 2011 certification procedures.
d. Role of EGCC 2011 coordinator.
e. Construction waste management.
f. Construction operations and EGCC 2011 requirements and restrictions.

3. Minutes: Entity responsible for conducting meeting will record and distribute meeting minutes.

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

1. Attendees: Installer and representatives of manufacturers and fabricators involved in or affected by the installation and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise Architect and Owner , and Owner's EGCC 2011 Verifer & Rater of scheduled meeting dates.
2. Agenda: Review progress of other construction activities and preparations for the particular activity under consideration, including requirements for the following:

a. Contract Documents.
b. Options.
c. Related RFIs.
d. Related Change Orders.
e. Purchases.
f. Deliveries.
g. Submittals.
h. EGCC 2011 requirements Sustainable design requirements.
i. Review of mockups.
j. Possible conflicts.
k. Compatibility requirements.
l. Time schedules.
m. Weather limitations.
n. Manufacturer's written instructions.
o. Warranty requirements.
p. Compatibility of materials.
q. Acceptability of substrates.
r. Temporary facilities and controls.
s. Space and access limitations.
t. Regulations of authorities having jurisdiction.
u. Testing and inspecting requirements.
v. Installation procedures.
w. Coordination with other work.
x. Required performance results.
y. Protection of adjacent work.
z. Protection of construction and personnel.

3. Record significant conference discussions, agreements, and disagreements, including required corrective measures and actions.
4. Reporting: Distribute minutes of the meeting to each party present and to other parties requiring information.
5. Do not proceed with installation if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of the Work and reconvene the conference at earliest feasible date.

E. Project Closeout Conference: Schedule and conduct a project closeout conference, at a time convenient to Owner and Architect, but no later than 90 days prior to the scheduled date of Substantial Completion.

1. Conduct the conference to review requirements and responsibilities related to Project closeout.
2. Attendees: Authorized representatives of Owner, Owner's EGCC 2011 Verifer & Rater, Architect, and their consultants; Contractor and its superintendent; major subcontractors; suppliers; and other concerned parties shall attend the meeting. Participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Discuss items of significance that could affect or delay Project closeout, including the following:

    a. Preparation of record documents.
    b. Procedures required prior to inspection for Substantial Completion and for final inspection for acceptance.
    c. Submittal of written warranties.
    d. Requirements for completing EGCC 2011 sustainable design documentation.
    e. Requirements for preparing operations and maintenance data.
    f. Requirements for delivery of material samples, attic stock, and spare parts.
    g. Requirements for demonstration and training.
    h. Preparation of Contractor's punch list.
    i. Procedures for processing Applications for Payment at Substantial Completion and for final payment.
    j. Submittal procedures.

4. Minutes: Entity conducting meeting will record and distribute meeting minutes.

F. Progress Meetings: Conduct progress meetings at weekly intervals.

1. Coordinate dates of meetings with preparation of payment requests.
2. Attendees: In addition to representatives of Owner, Owner's EGCC 2011 Verifier & Rater] and Architect, each contractor, subcontractor, supplier, and other entity concerned with current progress or involved in planning, coordination, or performance of future activities shall be represented at these meetings. All participants at the meeting shall be familiar with Project and authorized to conclude matters relating to the Work.
3. Agenda: Review and correct or approve minutes of previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to status of Project.

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

1) Review schedule for next period.

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

1) Interface requirements.
2) Sequence of operations.
3) Status of submittals.
4) Status of EGCC 2011 sustainable design 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.

4. Minutes: Entity responsible for conducting the meeting will record and distribute the meeting minutes to each party present and to parties requiring information.

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

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION (Not Used)

END OF SECTION 013100

SECTION 013200 - CONSTRUCTION PROGRESS DOCUMENTATION

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes administrative and procedural requirements for documenting the progress of construction during performance of the Work, including the following:

1. Startup construction schedule.
2. Contractor's construction schedule.
3. Construction schedule updating reports.
4. Material location reports.
5. Site condition reports.
6. Special reports.

B. Related Requirements:
1. Division 01 Section "Submittal Procedures" for submitting schedules and reports.
2. Division 01 Section "Quality Requirements" for submitting a schedule of tests and inspections.

1.3 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.

B. Cost Loading: The allocation of the schedule of values for the completion of an activity as scheduled. The sum of costs for all activities must equal the total Contract Sum unless otherwise approved by Architect.

C. CPM: Critical path method, which is a method of planning and scheduling a construction project where activities are arranged based on activity relationships. Network calculations determine when activities can be performed and the critical path of Project.

D. Critical Path: The longest connected chain of interdependent activities through the network schedule that establishes the minimum overall Project duration and contains no float.

E. Event: The starting or ending point of an activity.

F. Float: The measure of leeway in starting and completing an activity.

1. Float time is not for the exclusive use or benefit of either Owner or Contractor, but is a jointly owned, expiring Project resource available to both parties as needed to meet schedule milestones and Contract completion date.
2. Free float is the amount of time an activity can be delayed without adversely affecting the early start of the successor activity.
3. Total float is the measure of leeway in starting or completing an activity without adversely affecting the planned Project completion date.

G. Resource Loading: The allocation of manpower and equipment necessary for the completion of an activity as scheduled.

1.4 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.

B. Startup construction schedule.

1. Approval of cost-loaded, startup construction schedule will not constitute approval of schedule of values for cost-loaded activities.

C. Contractor's Construction Schedule: Initial schedule, of size required to display entire schedule for entire construction period.

D. CPM Reports: Concurrent with CPM schedule, submit each of the following reports. Format for each activity in reports shall contain activity number, activity description, cost and resource loading, original duration, remaining duration, early start date, early finish date, late start date, late finish date, and total float in calendar days.

1. Activity Report: List of all activities sorted by activity number and then early start date, or actual start date if known.
2. Logic Report: List of preceding and succeeding activities for all activities, sorted in ascending order by activity number and then early start date, or actual start date if known.
3. Total Float Report: List of all activities sorted in ascending order of total float.
4. Earnings Report: Compilation of Contractor's total earnings from commencement of the Work the Notice to Proceed until most recent Application for Payment.

E. Construction Schedule Updating Reports: Submit with Applications for Payment.

F. Daily Construction Reports: Submit at weekly intervals.

G. Material Location Reports: Submit at weekly intervals.

H. Site Condition Reports: Submit at time of discovery of differing conditions.

I. Special Reports: Submit at time of unusual event.

J. Qualification Data: For scheduling consultant.

1.5 QUALITY ASSURANCE

A. Prescheduling Conference: Conduct conference at Project site to comply with requirements in Division 01 Section "Project Management and Coordination." Review methods and procedures related to the preliminary construction schedule and Contractor's construction schedule, including, but not limited to, the following:
   1. Discuss constraints, including work stages area separations interim milestones .
   2. Review submittal requirements and procedures.
   3. Review time required for review of submittals and resubmittals.
   4. Review requirements for tests and inspections by independent testing and inspecting agencies.
   5. Review time required for Project closeout and Owner startup procedures, including commissioning activities.
   6. Review and finalize list of construction activities to be included in schedule.
   7. Review procedures for updating schedule.

1.6 COORDINATION

A. Coordinate preparation and processing of schedules and reports with performance of construction activities and with scheduling and reporting of separate contractors.

B. Coordinate Contractor's construction schedule with the schedule of values, list of subcontracts, 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 commencement of the Work the Notice of Award the Notice to Proceed to date of Substantial Completion 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: Treat each story or separate area as a separate numbered activity for each main element of the Work. Comply with the following:

1. Activity Duration: Define activities so no activity is longer than 30 days, unless specifically allowed by Architect.
2. Procurement Activities: Include procurement process activities for the following long lead items and major items, requiring a cycle of more than 60 days, as separate activities in schedule. Procurement cycle activities include, but are not limited to, submittals, approvals, purchasing, fabrication, and delivery.
3. Submittal Review Time: Include review and resubmittal times indicated in Division 01 Section "Submittal Procedures" in schedule. Coordinate submittal review times in Contractor's construction schedule with submittal schedule.
4. Startup and Testing Time: Include no fewer than 15 days for startup and testing.
5. Substantial Completion: Indicate completion in advance of date established for Substantial Completion, and allow time for Architect's administrative procedures necessary for certification of Substantial Completion.
6. Punch List and Final Completion: Include not more than 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. Products Ordered in Advance: Include a separate activity for each product. Include delivery date indicated in Division 01 Section "Summary." Delivery dates indicated stipulate the earliest possible delivery date.

D. Milestones: Include milestones indicated in the Contract Documents in schedule, including, but not limited to, the Notice to Proceed, Substantial Completion, and final completion.

E. Cost Correlation: Superimpose a cost correlation timeline, indicating planned and actual costs. On the line, show planned and actual dollar volume of the Work performed as of planned and actual dates used for preparation of payment requests.

F. Upcoming Work Summary: Prepare summary report indicating activities scheduled to occur or commence prior to submittal of next schedule update. Summarize the following issues:

1. Unresolved issues.
2. Unanswered Requests for Information.
3. Rejected or unreturned submittals.
4. Notations on returned submittals.
5. Pending modifications affecting the Work and Contract Time.

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

Indicate changes to working hours, working days, crew sizes, and equipment required to achieve compliance, and date by which recovery will be accomplished.

2.2 STARTUP CONSTRUCTION SCHEDULE

A. Bar-Chart Schedule: Submit startup, horizontal, bar-chart-type construction schedule within seven days of date established for the Notice of Award.

B. Preparation: Indicate each significant construction activity separately. Identify first workday of each week with a continuous vertical line. Outline significant construction activities for first 90 days of construction. Include skeleton diagram for the remainder of the Work and a cash requirement prediction based on indicated activities.

2.3 CONTRACTOR'S CONSTRUCTION SCHEDULE (GANTT CHART)

A. Gantt-Chart Schedule: Submit a comprehensive, fully developed, horizontal, Gantt-chart-type, Contractor's construction schedule within 30 days of date established for the Notice of Award. Base schedule on the startup construction schedule and additional information received since the start of Project.

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.

2.4 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 (see special reports).
10. Stoppages, delays, shortages, and losses.
11. Meter readings and similar recordings.
12. Emergency procedures.
13. Orders and requests of authorities having jurisdiction.
14. Change Orders received and implemented.
15. Construction Work 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. Material Location Reports: At weekly intervals, prepare and submit a comprehensive list of materials delivered to and stored at Project site. List shall be cumulative, showing materials previously reported plus items recently delivered. Include with list a statement of progress on and delivery dates for materials or items of equipment fabricated or stored away from Project site. Indicate the following categories for stored materials:

1. Material stored prior to previous report and remaining in storage.
2. Material stored prior to previous report and since removed from storage and installed.
3. Material stored following previous report and remaining in storage.

C. 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.

2.5 SPECIAL REPORTS

A. General: Submit special reports directly to Owner within three day(s) of an occurrence. Distribute copies of report to parties affected by the occurrence.

B. Reporting Unusual Events: When an event of an unusual and significant nature occurs at Project site, whether or not related directly to the Work, prepare and submit a special report. List chain of events, persons participating, response by Contractor's personnel, evaluation of results or effects, and similar pertinent information. Advise Owner in advance when these events are known or predictable.

PART 3 - EXECUTION

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Contractor's Construction Schedule Updating: At weekly intervals, update schedule to reflect actual construction progress and activities. Issue schedule three days 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 013200

SECTION 013300 - SUBMITTAL PROCEDURES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes requirements for the submittal schedule and administrative and procedural requirements for submitting Shop Drawings, Product Data, Samples, and other submittals.

B. Related Requirements:
1. Division 01 Section "Construction Progress Documentation" for submitting schedules and reports, including Contractor's construction schedule.
2. Division 01 Section "Operation and Maintenance Data" for submitting operation and maintenance manuals.
3. Division 01 Section "Project Record Documents" for submitting record Drawings, record Specifications, and record Product Data.
4. Division 01 Section "Demonstration and Training" for submitting video recordings of demonstration of equipment and training of Owner's personnel.

1.3 DEFINITIONS

A. Action Submittals: Written and graphic information and physical samples that require Architect's responsive action. Action submittals are those submittals indicated in individual Specification Sections as "action submittals."

B. Informational Submittals: Written and graphic information and physical samples that do not require Architect's responsive action. Submittals may be rejected for not complying with requirements. Informational submittals are those submittals indicated in individual Specification Sections as "informational submittals."

1.4 ACTION SUBMITTALS

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

1. Coordinate submittal schedule with list of subcontracts, the schedule of values, and Contractor's construction schedule.
2. Initial Submittal: Submit concurrently with startup construction schedule. Include submittals required during the first 60 days of construction. List those submittals required to maintain orderly progress of the Work and those required early because of long lead time for manufacture or fabrication.
3. Final Submittal: Submit concurrently with the first complete submittal of Contractor's construction schedule.

    a. Submit revised submittal schedule to reflect changes in current status and timing for submittals.

4. Format: Arrange the following information in a tabular format:

    a. Scheduled date for first submittal.
    b. Specification Section number and title.
    c. Submittal category: Action; informational.
    d. Name of subcontractor.
    e. Description of the Work covered.
    f. Scheduled date for Architect's final release or approval.
    g. Scheduled date of fabrication.
    h. Scheduled dates for purchasing.
    i. Scheduled dates for installation.
    j. Activity or event number.

5. Submittal schedule is due within 30 days of start of construction.

B. Delivery Schedule: Submit a schedule of dates of anticipated deliveries of long lead items and major item components. Items include, but are not limited to:

    a. Site Lighting
    b. Light Fixtures
    c. Electrical Panels and Switch Gear
    d. Furnaces
    e. Water Heater
    f. Lumber Roofing
    g. Millwork
    h. Plumbing Fixtures
    i. Windows
    j. Doors
    k. Floor Covering
    l. Drywall
    m. Specialty Items

1.5 SUBMITTAL ADMINISTRATIVE REQUIREMENTS

A. Architect's Digital Data Files: Electronic digital data files of the Contract Drawings will be provided by Architect for Contractor's use in preparing submittals.

1. Architect will furnish Contractor one set of digital data drawing files of the Contract Drawings for use in preparing Shop Drawings.

    a. Architect makes no representations as to the accuracy or completeness of digital data drawing files as they relate to the Contract Drawings.
    b. Digital Drawing Software Program: The Contract Drawings are available in AutoCAD 2011.
    c. Contractor shall execute a data licensing agreement in the form of Agreement form acceptable to Owner and Architect.
    d. The following digital data files will by furnished for each appropriate discipline:

        1) Floor plans.
        2) Reflected ceiling plans.

B. Coordination: Coordinate preparation and processing of submittals with performance of construction activities.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals, and related activities that require sequential activity.
2. Submit all submittal items required for each Specification Section concurrently unless partial submittals for portions of the Work are indicated on approved submittal schedule.
3. Submit action submittals and informational submittals required by the same Specification Section as separate packages under separate transmittals.

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

1. Initial Review: Allow 15 days for initial review of each submittal. Allow additional time if coordination with subsequent submittals is required. Architect will advise Contractor when a submittal being processed must be delayed for coordination.
2. Intermediate Review: If intermediate submittal is necessary, process it in same manner as initial submittal.
3. Resubmittal Review: Allow 15 days for review of each resubmittal.
4. Sequential Review: Where sequential review of submittals by Architect's consultants, Owner, or other parties is indicated, allow 21 days for initial review of each submittal.

    a. At Architect’s Request

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 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 return without review submittals received from sources other than Contractor.

a. Transmittal Form for Paper Submittals: Use AIA Document G810 or CSI Form 12.1A [
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 Contractor.
7) Name of firm or entity that prepared submittal.
8) Names of subcontractor, manufacturer, and supplier.
9) Category and type of submittal.
10) Submittal purpose and description.
11) Specification Section number and title.
12) Specification paragraph number or drawing designation and generic name for each of multiple items.
13) Drawing number and detail references, as appropriate.

14) Indication of full or partial submittal.
15) Transmittal number, numbered consecutively.
16) Submittal and transmittal distribution record.
17) Remarks.
18) 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., LNHS-061000.01). Resubmittals shall include an alphabetic suffix after another decimal point (e.g., LNHS-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 Contractor.
    e. Name of firm or entity that prepared submittal.
    f. Names of subcontractor, manufacturer, and supplier.
    g. Category and type of submittal.
    h. Submittal purpose and description.
    i. Specification Section number and title.
    j. Specification paragraph number or drawing designation and generic name for each of multiple items.
    k. Drawing number and detail references, as appropriate.
    l. Location(s) where product is to be installed, as appropriate.
    m. Related physical samples submitted directly.
    n. Indication of full or partial submittal.
    o. Transmittal number, numbered consecutively.
    p. Submittal and transmittal distribution record.
    q. Other necessary identification.
    r. 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.
e. .

F. Options: Identify options requiring selection by Architect.

G. Deviations and Additional Information: On an attached separate sheet, prepared on Contractor's letterhead, record relevant information, requests for data, revisions other than those requested by Architect on previous submittals, and deviations from requirements in the Contract Documents, including minor variations and limitations. Include same identification information as related submittal.

H. Resubmittals: Make resubmittals in same form and number of copies as initial submittal.

1. Note date and content of previous submittal.
2. Note date and content of revision in label or title block and clearly indicate extent of revision.
3. Resubmit submittals until they are marked with approval notation from Architect's action stamp.

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

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

PART 2 - PRODUCTS

2.1 SUBMITTAL PROCEDURES

A. General Submittal Procedure Requirements: Prepare and submit submittals required by individual Specification Sections. Types of submittals are indicated in individual Specification Sections.

1. Post electronic submittals as PDF electronic files directly to Architect's FTP site specifically established for Project.

a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

2. Submit electronic submittals via email as PDF electronic files.

a. Architect will return annotated file. Annotate and retain one copy of file as an electronic Project record document file.

3. Action Submittals: Submit five paper copies of each submittal unless otherwise indicated. Architect will return four copies.

4. Informational Submittals: Submit five paper copies of each submittal unless otherwise indicated. Architect will not return copies.
5. 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.

    a. Provide a digital signature with digital certificate on electronically submitted certificates and certifications where indicated.
    b. 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.
6. Submit Product Data in the following format:

    a. PDF electronic file.
    b. five paper copies of Product Data unless otherwise indicated. Architect will return four copies.

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, but no larger than 30 by 42 inches .
3. Submit Shop Drawings in the following format:

    a. PDF electronic file.
    b. Five opaque (bond) copies of each submittal. Architect will return four copy(ies).

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

1. Transmit Samples that contain multiple, related components such as accessories together in one submittal package.
2. Identification: Attach label on unexposed side of Samples that includes the following:

    a. Generic description of Sample.
    b. Product name and name of manufacturer.
    c. Sample source.
    d. Number and title of applicable Specification Section.
    e. Specification paragraph number and generic name of each item.

3. For projects where electronic submittals are required, provide corresponding electronic submittal of Sample transmittal, digital image file illustrating Sample characteristics, and identification information for record.
4. Disposition: Maintain sets of approved Samples at Project site, available for quality-control comparisons throughout the course of construction activity. Sample sets may be used to determine final acceptance of construction associated with each set.

    a. Samples that may be incorporated into the Work are indicated in individual Specification Sections. Such Samples must be in an undamaged condition at time of use.
    b. Samples not incorporated into the Work, or otherwise designated as Owner's property, are the property of Contractor.

5. Samples for Initial Selection: Submit manufacturer's color charts consisting of units or sections of units showing the full range of colors, textures, and patterns available.

    a. Number of Samples: Submit one full set(s) of available choices where color, pattern, texture, or similar characteristics are required to be selected from manufacturer's product line. Architect will return submittal with options selected.

6. Samples for Verification: Submit full-size units or Samples of size indicated, prepared from same material to be used for the Work, cured and finished in manner specified, and physically identical with material or product proposed for use, and that show full range of color and texture variations expected. Samples include, but are not limited to, the following: partial sections of manufactured or fabricated components; small cuts or containers of materials; complete units of repetitively used materials; swatches showing color, texture, and pattern; color range sets; and components used for independent testing and inspection.

    a. Number of Samples: Submit three sets of Samples. Architect will retain one Sample sets; remainder will be returned. Mark up and retain one returned Sample set as a project record sample.

        1) Submit a single Sample where assembly details, workmanship, fabrication techniques, connections, operation, and other similar characteristics are to be demonstrated.
        2) If variation in color, pattern, texture, or other characteristic is inherent in material or product represented by a Sample, submit at least three sets of paired units that show approximate limits of variations.

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

1. Type of product. Include unique identifier for each product indicated in the Contract Documents or assigned by Contractor if none is indicated.
2. Manufacturer and product name, and model number if applicable.
3. Number and name of room or space.
4. Location within room or space.
5. Submit product schedule in the following format:

    a. PDF electronic file.
    b. Three paper copies of product schedule or list unless otherwise indicated. Architect will return two copies.

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

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

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

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

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

K. Maintenance Data: Comply with requirements specified in Division 01 Section "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. Include the following information:

1. Name of evaluation organization.
2. Date of evaluation.

3. Time period when report is in effect.
4. Product and manufacturers' names.
5. Description of product.
6. Test procedures and results.
7. Limitations of use.

U. 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.

V. 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.

W. 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.

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

2.2 DELEGATED-DESIGN SERVICES

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

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

B. Delegated-Design Services Certification: In addition to Shop Drawings, Product Data, and other required submittals, submit digitally signed PDF electronic file paper copies 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 Division 01 Section "Closeout Procedures."

C. Approval Stamp: Stamp each submittal with a uniform, approval stamp. Include Project name and location, submittal number, Specification Section title and number, name of reviewer, date of Contractor's approval, and statement certifying that submittal has been reviewed, checked, and approved for compliance with the Contract Documents.

3.2 ARCHITECT'S ACTION

A. Action Submittals: Architect will review each submittal, make marks to indicate corrections or revisions required, and return it. Architect will stamp each submittal with an action stamp and will mark stamp appropriately to indicate action.

B. Informational Submittals: Architect will review each submittal and will not return it, or will return it if it does not comply with requirements. Architect will forward each submittal to appropriate party.

C. Partial submittals prepared for a portion of the Work will be reviewed when use of partial submittals has received prior approval from Architect.

D. Incomplete submittals are unacceptable, will be considered nonresponsive, and will be returned for resubmittal without review.

E. Submittals not required by the Contract Documents may be returned by the Architect without action.

END OF SECTION 013300

SECTION 014000 - QUALITY REQUIREMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

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

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

1. Specific quality-assurance and -control requirements for individual construction activities are specified in the Sections that specify those activities. Requirements in those Sections may also cover production of standard products.
2. Specified tests, inspections, and related actions do not limit Contractor's other quality-assurance and -control procedures that facilitate compliance with the Contract Document requirements.
3. Requirements for Contractor to provide quality-assurance and -control services required by Architect, Owner, or authorities having jurisdiction are not limited by provisions of this Section.

C. Related Requirements:
1. Divisions 02 through 33 Sections for specific test and inspection requirements.

1.3 DEFINITIONS

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

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

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. Product Testing: Tests and inspections that are performed by an NRTL, an NVLAP, or a testing agency qualified to conduct product testing and acceptable to authorities having jurisdiction, to establish product performance and compliance with specified requirements.

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

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

H. Testing Agency: An entity engaged to perform specific tests, inspections, or both. Testing laboratory shall mean the same as testing agency.

I. Installer/Applicator/Erector: Contractor or another entity engaged by Contractor as an employee, Subcontractor, or Sub-subcontractor, to perform a particular construction operation, including installation, erection, application, and similar operations.

1. 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).

J. Experienced: When used with an entity or individual, "experienced" means having successfully completed a minimum of five 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.

1.4 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.

1.5 ACTION SUBMITTALS

A. Shop Drawings: For integrated exterior and orlaboratory mockups, provide plans, sections, and elevations, indicating materials and size of mockup construction.

1. Indicate manufacturer and model number of individual components.
2. Provide axonometric drawings for conditions difficult to illustrate in two dimensions.

1.6 INFORMATIONAL SUBMITTALS

A. Contractor's Quality-Control Plan: For quality-assurance and quality-control activities and responsibilities.

B. Qualification Data : For Contractor's quality-control personnel.

C. 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 following systems:

1. Seismic-force-resisting system, designated seismic system, or component listed in the designated seismic system quality-assurance plan prepared by Architect.
2. Main wind-force-resisting system or a wind-resisting component listed in the wind-force-resisting system quality-assurance plan prepared by Architect.

D. 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.

E. Schedule of Tests and Inspections: Prepare in tabular form and include the following:

1. Specification Section number and title.
2. Entity responsible for performing tests and inspections.
3. Description of test and inspection.
4. Identification of applicable standards.
5. Identification of test and inspection methods.
6. Number of tests and inspections required.
7. Time schedule or time span for tests and inspections.
8. Requirements for obtaining samples.
9. Unique characteristics of each quality-control service.

1.7 CONTRACTOR'S QUALITY-CONTROL PLAN

A. Quality-Control Plan, General: Submit quality-control plan within 10 days of Notice to Proceed, and not less than five days prior to preconstruction conference. Submit in format acceptable to Architect. Identify personnel, procedures, controls, instructions, tests, records, and forms to be used to carry out Contractor's quality-assurance and quality-control responsibilities. Coordinate with Contractor's construction schedule.

B. Quality-Control Personnel Qualifications: Engage qualified full-time personnel trained and experienced in managing and executing quality-assurance and quality-control procedures similar in nature and extent to those required for Project.

1. Project quality-control manager may also serve as Project superintendent .
2. .

C. Submittal Procedure: Describe procedures for ensuring compliance with requirements through review and management of submittal process. Indicate qualifications of personnel responsible for submittal review.

D. Testing and Inspection: In quality-control plan, include a comprehensive schedule of Work requiring testing or inspection, including the following:

1. Contractor-performed tests and inspections including subcontractor-performed tests and inspections. Include required tests and inspections and Contractor-elected tests and inspections.
2. Special inspections required by authorities having jurisdiction and indicated on the "Statement of Special Inspections."
3. The only Owner-performed tests and inspections indicated in the Contract Documents is for , tests and inspections indicated to be performed by the EGCC 2011 Rater & Verifier.

E. Continuous Inspection of Workmanship: Describe process for continuous inspection during construction to identify and correct deficiencies in workmanship in addition to testing and inspection specified. Indicate types of corrective actions to be required to bring work into compliance with standards of workmanship established by Contract requirements and approved mockups.

F. Monitoring and Documentation: Maintain testing and inspection reports including log of approved and rejected results. Include work Architect has indicated as nonconforming or defective. Indicate corrective actions taken to bring nonconforming work into compliance with requirements. Comply with requirements of authorities having jurisdiction.

1.8 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.
7. Identification of product and Specification Section.
8. Complete test or inspection data.
9. Test and inspection results and an interpretation of test results.

10. Record of temperature and weather conditions at time of sample taking and testing and inspecting.
11. Comments or professional opinion on whether tested or inspected Work complies with the Contract Document requirements.
12. Name and signature of laboratory inspector.
13. Recommendations on retesting and reinspecting.

B. Manufacturer's Technical Representative's Field Reports: Prepare written information documenting manufacturer's technical representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of technical representative making report.
2. Statement on condition of substrates and their acceptability for installation of product.
3. Statement that products at Project site comply with requirements.
4. Summary of installation procedures being followed, whether they comply with requirements and, if not, what corrective action was taken.
5. Results of operational and other tests and a statement of whether observed performance complies with requirements.
6. Statement whether conditions, products, and installation will affect warranty.
7. Other required items indicated in individual Specification Sections.

C. Factory-Authorized Service Representative's Reports: Prepare written information documenting manufacturer's factory-authorized service representative's tests and inspections specified in other Sections. Include the following:

1. Name, address, and telephone number of factory-authorized service representative making report.
2. Statement that equipment complies with requirements.
3. Results of operational and other tests and a statement of whether observed performance complies with requirements.
4. Statement whether conditions, products, and installation will affect warranty.
5. Other required items indicated in individual Specification Sections.

D. 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.

1.9 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.

1. NRTL: A nationally recognized testing laboratory according to 29 CFR 1910.7.
2. NVLAP: A testing agency accredited according to NIST's National Voluntary Laboratory Accreditation Program.

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

J. Preconstruction Testing: Where testing agency is indicated to perform preconstruction testing for compliance with specified requirements for performance and test methods, comply with the following:

1. Contractor responsibilities include the following:

a. Provide test specimens representative of proposed products and construction.

b. Submit specimens in a timely manner with sufficient time for testing and analyzing results to prevent delaying the Work.
c. Provide sizes and configurations of test assemblies, mockups, and laboratory mockups to adequately demonstrate capability of products to comply with performance requirements.
d. Build site-assembled test assemblies and mockups using installers who will perform same tasks for Project.
e. Build laboratory mockups at testing facility using personnel, products, and methods of construction indicated for the completed Work.
f. When testing is complete, remove test specimens, assemblies, and mockups, and laboratory mockups; do not reuse products on Project.

2. Testing Agency Responsibilities: Submit a certified written report of each test, inspection, and similar quality-assurance service to Architect, with copy to Contractor. Interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from the Contract Documents.

K. Mockups: Before installing portions of the Work requiring mockups, build mockups for each form of construction and finish required to comply with the following requirements, using materials indicated for the completed Work:

1. Build mockups in location and of size indicated or, if not indicated, as directed by Architect.
2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
3. Employ supervisory personnel who will oversee mockup construction. Employ workers that will be employed during the construction at Project.
4. Demonstrate the proposed range of aesthetic effects and workmanship.
5. Obtain Architect's approval of mockups before starting work, fabrication, or construction.

a. Allow seven days for initial review and each re-review of each mockup.

6. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
7. Demolish and remove mockups when directed unless otherwise indicated.

1.10 QUALITY CONTROL

A. Owner Responsibilities: At the Owner’s discretion the Owner will engage a third party testing agency to oversee the contractors testing and inspection agency. The owner shall pay for the cost of the third party testing agency..

1. Contractor will furnish Owner with names, addresses, and telephone numbers of testing agencies engaged.
2. Costs for retesting and reinspecting construction that replaces or is necessitated by work that failed to comply with the Contract Documents will be charged to Contractor.

B. Contractor Responsibilities: All Tests and inspections including special inspections are Contractor's responsibility unless otherwise indicated in the contract documents. All additional quality-control activities required to verify that the Work complies with requirements, whether specified or not. Contractor shall submit to Architect and Owner the names , address, telephone numbers, and company qualifications of each testing agency engaged along with a description of types and inspections they are engaged to perform.

1. Unless otherwise indicated, provide quality-control services specified and those required by authorities having jurisdiction. Perform quality-control services required of Contractor by authorities having jurisdiction, whether specified or not.
2. 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.

3. Notify testing agencies at least 24 hours in advance of time when Work that requires testing or inspecting will be performed.
4. Where quality-control services are indicated as Contractor's responsibility, submit a certified written report, in duplicate, of each quality-control service.
5. Testing and inspecting requested by Contractor and not required by the Contract Documents are Contractor's responsibility.
6. Submit additional copies of each written report directly to authorities having jurisdiction, when they so direct.

C. Manufacturer's Field Services: Where indicated, engage a factory-authorized service representative to inspect field-assembled components and equipment installation, including service connections. Report results in writing as specified in Division 01 Section "Submittal Procedures."

D. Manufacturer's Technical Services: Where indicated, engage a manufacturer's technical representative to observe and inspect the Work. Manufacturer's technical representative's services include participation in preinstallation conferences, examination of substrates and conditions, verification of materials, observation of Installer activities, inspection of completed portions of the Work, and submittal of written reports.

E. Retesting/Reinspecting: Provide quality-control services, including retesting and reinspecting, for construction that replaced Work that failed to comply with the Contract Documents. Costs for retesting is the contractors responsibility.

F. Testing Agency Responsibilities: Cooperate with Architect and Contractor in performance of duties. Provide qualified personnel to perform required tests and inspections.

1. Notify Architect and Contractor promptly of irregularities or deficiencies observed in the Work during performance of its services.
2. Determine the location from which test samples will be taken and in which in-situ tests are conducted.

3. Conduct and interpret tests and inspections and state in each report whether tested and inspected work complies with or deviates from requirements.
4. Submit a certified written report, in duplicate, of each test, inspection, and similar quality-control service through Contractor.
5. Do not release, revoke, alter, or increase the Contract Document requirements or approve or accept any portion of the Work.
6. Do not perform any duties of Contractor.

G. 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.

H. 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.

I. Schedule of Tests and Inspections: Prepare a schedule of tests, inspections, and similar quality-control services required by the Contract Documents as a component of Contractor's quality-control plan. Coordinate and submit concurrently with Contractor's construction schedule. Update as the Work progresses.

1. Distribution: Distribute schedule to Owner, Architect, testing agencies, and each party involved in performance of portions of the Work where tests and inspections are required.

1.11 SPECIAL TESTS AND INSPECTIONS

A. Special Tests and Inspections: Contractor will engage a qualified testing agency special inspector to conduct special tests and inspections required by authorities having jurisdiction as the responsibility of Owner, and as follows:

B. Special Tests and Inspections: Conducted by a qualified testing agency or special inspector as required by authorities having jurisdiction, as indicated in individual Specification Sections and in Statement of Special Inspections attached to this Section, and as follows:

1. Verifying that manufacturer maintains detailed fabrication and quality-control procedures and reviews the completeness and adequacy of those procedures to perform the Work.
2. Notifying Architect and Contractor promptly of irregularities and deficiencies observed in the Work during performance of its services.
3. Submitting a certified written report of each test, inspection, and similar quality-control service to Architect with copy to Contractor and to authorities having jurisdiction.
4. Submitting a final report of special tests and inspections at Substantial Completion, which includes a list of unresolved deficiencies.
5. Interpreting tests and inspections and stating in each report whether tested and inspected work complies with or deviates from the Contract Documents.
6. Retesting and reinspecting corrected work.

PART 2 - PRODUCTS (Not Used)

PART 3 - EXECUTION

3.1 TEST AND INSPECTION LOG

A. 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 Division 01 Section "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 014000

SECTION 01 6000 - PRODUCT REQUIREMENTS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Provisions for the quality and handling of materials, equipment, and systems.

1.02 QUALITY ASSURANCE

A. Comply with the Contract Documents and referenced standards as minimum requirements.

B. NOTE THAT ALL ACCESSABILITY STANDARDS REQUIREMENTS MUST BE MEET ABSOLUTELY, ANY INCORRECT IN PLACE CONSTRUCTION THAT IS NOT BUILT MEETING THESE GUIDELINES WILL BE REBUILT TO MEET THE REQUIRED CRITERIA AT THE EXPENSE OF THE CONTRACTOR.

C. Ensure that all materials are new (not surplus), first quality (not rejected from other projects or “seconds”), and delivered to site in the manufacturer’s original, unopened, and properly labeled containers.

D. Ensure that product labels indicate the manufacturer’s name; name and type of material; color, mixing and installation instructions; and curing time, if applicable.

E. Ensure that containers of those materials having a critical shelf life bear the date material was packaged or the expiration date of the material. Remove from site any material for which the normal shelf life has expired.

F. Maintain containers in a clean condition, free of foreign materials and residue.

G. Do not re-use materials or components removed from existing structure, except as specifically required or allowed by Contract Documents.

H. Dumpsters, delivery trucks, or heavy equipment are not permitted on landscaped or concreted areas without prior owner approval.

1.03 DELIVERY

A. These definitions refer specifically to contents of this Section and are not repeated in Division 01 Section "References."

B. Transport products by appropriate methods to avoid product damage; deliver in undamaged condition in manufacturer’s unopened containers or packaging.

C. Provide equipment and personnel to handle products by appropriate methods to prevent soiling or damage.

D. Promptly inspect shipments to ensure that products comply with requirements, quantities are correct, and products are undamaged.

1.04 STORAGE

A. Contractor assumes all risks associated with storing materials, tools, and equipment on site.

B. Store products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive products in weather-tight enclosures; maintain within temperature and humidity ranges required by manufacturer's instructions.

C. Neatly arrange the products in storage to provide access for inspection. Periodically inspect products to ensure that they are undamaged and maintained under required conditions.

PART 2 – PRODUCTS (Not Used)

PART 3 – EXECUTION (Not Used)

END OF SECTION 01 6000

SECTION 017823 - OPERATION AND MAINTENANCE DATA

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. 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.

B. Related Requirements:
1. Division 01 Section "Submittal Procedures" for submitting copies of submittals for operation and maintenance manuals.
2. Divisions 02 through 33 Sections for specific operation and maintenance manual requirements for the Work in those Sections.

1.3 DEFINITIONS

A. System: An organized collection of parts, equipment, or subsystems united by regular interaction.

B. Subsystem: A portion of a system with characteristics similar to a system.

1.4 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 and EGCC 2011 Verifer & Rater] 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:

1. PDF electronic file. Assemble each manual into a composite electronically indexed file. Submit on digital media acceptable to Architect.

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. Initial Manual Submittal: Submit draft copy of each manual at least 30 days before commencing demonstration and training. Architect will comment on whether general scope and content of manual are acceptable.

D. Final Manual Submittal: Submit each manual in final form prior to requesting inspection for Substantial Completion and at least 15 days before commencing demonstration and training. Architect will return copy with comments.

1. Correct or revise each manual to comply with Architect's comments. Submit copies of each corrected manual within 15 days of receipt of Architect's comments and prior to commencing demonstration and training.

PART 2 - PRODUCTS

2.1 OPERATION AND MAINTENANCE DOCUMENTATION DIRECTORY

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. Include a section in the directory for each of the following:

1. List of documents.
2. List of systems.
3. List of equipment.
4. Table of contents.

B. List of Systems and Subsystems: List systems alphabetically. Include references to operation and maintenance manuals that contain information about each system.

C. List of Equipment: List equipment for each system, organized alphabetically by system. For pieces of equipment not part of system, list alphabetically in separate list.

D. Tables of Contents: Include a table of contents for each emergency, operation, and maintenance manual.

E. Identification: In the documentation directory and in each operation and maintenance manual, identify each system, subsystem, and piece of equipment with same designation used in the Contract Documents. If no designation exists, assign a designation according to ASHRAE Guideline 4, "Preparation of Operating and Maintenance Documentation for Building Systems."

2.2 REQUIREMENTS FOR EMERGENCY, OPERATION, AND MAINTENANCE MANUALS

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

1. Title page.
2. Table of contents.
3. Manual contents.

B. Title Page: 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. Names and contact information for major consultants to the Architect that designed the systems contained in the manuals.
8. Cross-reference to related systems in other operation and maintenance manuals.

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

1. If operation or maintenance documentation requires more than one volume to accommodate data, include comprehensive table of contents for all volumes in each volume of the set.

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

E. 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.

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

1. Binders: Heavy-duty, three-ring, vinyl-covered, loose-leaf binders, in thickness necessary to accommodate contents, sized to hold 8-1/2-by-11-inch paper; with clear plastic sleeve on spine to hold label describing contents and with pockets inside covers to hold folded oversize sheets.

a. If two or more binders are necessary to accommodate data of a system, organize data in each binder into groupings by subsystem and related components. Cross-

reference other binders if necessary to provide essential information for proper operation or maintenance of equipment or system.

b. Identify each binder on front and spine, with printed title "OPERATION AND MAINTENANCE MANUAL," Project title or name, and subject matter of contents, and indicate Specification Section number on bottom of spine. Indicate volume number for multiple-volume sets.

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. Supplementary Text: Prepared on 8-1/2-by-11-inch white bond paper.
5. Drawings: Attach reinforced, punched binder tabs on drawings and bind with text.

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

2.3 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. Gas leak.
4. Water leak.
5. Power failure.
6. Water outage.
7. System, subsystem, or equipment failure.
8. 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.

2.4 OPERATION MANUALS

A. Content: In addition to requirements in this Section, include operation data required in individual Specification Sections and the following information:

1. System, subsystem, and equipment descriptions. Use designations for systems and equipment indicated on Contract Documents.
2. Performance and design criteria if Contractor has 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.
6. Normal shutdown instructions.
7. Seasonal and weekend operating instructions.
8. Required sequences for electric or electronic systems.
9. Special operating instructions and procedures.

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

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

2.5 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 and drawing or schedule designation or identifier where applicable.

C. Product Information: Include the following, as applicable:

1. Product name and model number.
2. Manufacturer's name.
3. Color, pattern, and texture.
4. Material and chemical composition.
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.

1. Include procedures to follow and required notifications for warranty claims.

2.6 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 and drawing or schedule designation or identifier where applicable.

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.

1. Scheduled Maintenance and Service: Tabulate actions for daily, weekly, monthly, quarterly, semiannual, and annual frequencies.
2. Maintenance and Service Record: Include manufacturers' forms for recording maintenance.

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

G. 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.

1. Include procedures to follow and required notifications for warranty claims.

PART 3 - EXECUTION

3.1 MANUAL PREPARATION

A. Operation and Maintenance Documentation Directory: Prepare a separate manual that provides an organized reference to emergency, operation, and maintenance manuals.

B. 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.

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

D. Operation and Maintenance Manuals: Assemble 3 complete sets of operation and maintenance data indicating operation and maintenance of each system, subsystem, and piece of equipment not part of a system.

1. Engage a factory-authorized service representative to assemble and prepare information for each system, subsystem, and piece of equipment not part of a system.
2. Prepare a separate manual for each system and subsystem, in the form of an instructional manual for use by Owner's operating personnel.

E. Manufacturers' Data: Where manuals contain manufacturers' standard printed data, include only sheets pertinent to product or component installed. Mark each sheet to identify each

product or component incorporated into the Work. If data include more than one item in a tabular format, identify each item using appropriate references from the Contract Documents. Identify data applicable to the Work and delete references to information not applicable.

1. Prepare supplementary text if manufacturers' standard printed data are not available and where the information is necessary for proper operation and maintenance of equipment or systems.

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

1. Do not use original project record documents as part of operation and maintenance manuals.
2. Comply with requirements of newly prepared record Drawings in Division 01 Section "Project Record Documents."

G. Comply with Division 01 Section "Closeout Procedures" for schedule for submitting operation and maintenance documentation.

END OF SECTION 017823

SECTION 01 7839 - PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. This Section includes administrative and procedural requirements for Project Record Documents, including the following:

1. Record Drawings.
2. Record Specifications.
3. Record Product Data.

B. Related Sections include the following:
1. Division 1 Section "Closeout Procedures" for general closeout procedures.
2. Divisions 2 through 33 Sections for specific requirements for Project Record Documents of the Work in those Sections.

1.3 SUBMITTALS

A. Record Drawings: Comply with the following:

1. Number of Copies: Submit one set(s) of marked-up Record Prints.
2. Number of Copies: Submit copies of Record Drawings as follows:

a. Initial Submittal: Submit one set(s) of plots from corrected Record CAD Drawings and one set(s) of marked-up Record Prints. Architect will initial and date each plot and mark whether general scope of changes, additional information recorded, and quality of drafting are acceptable. Architect will return plots and prints for organizing into sets, printing, binding, and final submittal.
b. Final Submittal: Submit one set(s) of marked-up Record Prints, one set(s) of Record CAD Drawing files, one set(s) of Record CAD Drawing plots, and three copies printed from record plots. Plot and print each Drawing, whether or not changes and additional information were recorded.

1) Electronic Media: CD-R.

B. Record Specifications: Submit one copy of Project's Specifications, including addenda and contract modifications.

C. Record Product Data: Submit one copy of each Product Data submittal.

1. Where Record Product Data is required as part of operation and maintenance manuals, submit marked-up Product Data as an insert in manual instead of submittal as Record Product Data.

PART 2 - PRODUCTS

2.1 RECORD DRAWINGS

A. Record Prints: Maintain one set of blue- or black-line white prints of the Contract Drawings and Shop Drawings.

1. Preparation: Mark Record Prints to show the actual installation where installation varies from that shown originally. Require individual or entity who obtained record data, whether individual or entity is Installer, subcontractor, or similar entity, to prepare the marked-up Record Prints.

a. Give particular attention to information on concealed elements that would be difficult to identify or measure and record later.
b. Accurately record information in an understandable drawing technique.
c. Record data as soon as possible after obtaining it. Record and check the markup before enclosing concealed installations.

2. Content: Types of items requiring marking include, but are not limited to, the following:

a. Dimensional changes to Drawings.
b. Revisions to details shown on Drawings.
c. Depths of foundations below first floor.
d. Locations and depths of underground utilities.
e. Revisions to routing of piping and conduits.
f. Revisions to electrical circuitry.
g. Actual equipment locations.
h. Duct size and routing.
i. Locations of concealed internal utilities.
j. Changes made by Change Order or Construction Change Directive.
k. Changes made following Architect's written orders.
l. Details not on the original Contract Drawings.
m. Field records for variable and concealed conditions.
n. Record information on the Work that is shown only schematically.

3. Mark the Contract Drawings or Shop Drawings, whichever is most capable of showing actual physical conditions, completely and accurately. If Shop Drawings are marked, show cross-reference on the Contract Drawings.
4. Mark record sets with erasable, red-colored pencil. Use other colors to distinguish between changes for different categories of the Work at same location.
5. Mark important additional information that was either shown schematically or omitted from original Drawings.
6. Note Construction Change Directive numbers, alternate numbers, Change Order numbers, and similar identification, where applicable.

B. Format: Identify and date each Record Drawing; include the designation "PROJECT RECORD DRAWING" in a prominent location.

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

3. 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. Mark copy with the proprietary name and model number of products, materials, and equipment furnished, including product options selected.
3. Record the name of manufacturer, supplier, Installer, and other information necessary to provide a record of selections made.
4. For each principal product, indicate whether Record Product Data has been submitted in operation and maintenance manuals instead of submitted as Record Product Data.
5. Note related Change Orders, Record Product Data, and Record Drawings where applicable.

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.

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.

PART 3 - EXECUTION

3.1 RECORDING AND MAINTENANCE

A. Recording: Maintain one copy of each submittal during the construction period for Project Record Document purposes. Post changes and modifications to Project Record Documents as they occur; do not wait until the end of Project.

B. Maintenance of Record Documents and Samples: Store Record Documents and Samples in the field office apart from the Contract Documents used for construction. Do not use Project Record Documents for construction purposes. Maintain Record Documents in good order and in a clean, dry, legible condition, protected from deterioration and loss. Provide access to Project Record Documents for Architect's reference during normal working hours.

END OF SECTION 01 7839

SECTION 01 7846 – MAINTENANCE MATERIALS

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

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

B. Specifications throughout all Divisions of the Project Manual are directly applicable to this Section, and this Section is directly applicable to them.

1.02 SUMMARY

A. Section includes minimum requirements for surplus maintenance materials of the same production run of installed products (attic stock) to be furnished as part of the Project and that Contractor shall deliver to Owner's designated storage facility.

B. Furnish maintenance materials as described within Part 2 – Schedule of Maintenance Material Items.

1.03 DEFINITIONS

A. Maintenance Materials: Additional material designated within this Section intended to match and replace non-standard products installed in this Project. Non-standard products may include materials that require a specific color or pattern.

B. Spare Parts: Parts, tools, service kits, or equipment components that are included in the purchase of the original equipment and are provided by the original equipment manufacturer for use by the Owner.

C. Perishable Items: Items such as paint, coatings, adhesives, batteries, and other items with a finite shelf life.

1.04 DELIVERY, STORAGE AND HANDLING

A. Prepare items for storage as follows:

1. Items shall be delivered in undamaged, original packing, or packaged in a protective covering for storage.

2. Item description, quantity, manufacturer's name and model number where applicable shall be clearly marked on a visible surface of the packaging.

3. Mechanical rooms, electrical rooms, telecommunications, and other service areas shall not be used as storage or staging areas unless Contractor obtains prior written approval from the Owner's property manager and Environmental Health and Safety representative.

B. Delivery:

1. Deliver materials directly to an Owner-approved, designated storage area, confirmed prior to delivery.

PART 2 - PRODUCTS

2.01 GENERAL

A. All materials shall meet or exceed all applicable referenced standards, federal, state and local requirements, and conform to codes and ordinances of authorities having jurisdiction.

B. A Maintenance Materials (Attic Stock) submittal shall be included with other required project submittals.

C. No paint, adhesive or other perishable attic stock will be required. Contractor shall provide the final paint schedule in PDF format and in paper format with paint chips attached. Contractor shall also provide a list of sealers and stains used on floors, tiles, and wood surfaces in PDF format and in paper format.

D. All finish materials are to be provided in full size units, cut or partial units are not acceptable.

E. No left-over parts such as junction boxes, conduits, ceiling grids, etc. will be accepted.

2.02 SCHEDULE OF MAINTENANCE MATERIAL ITEMS

A. Maintenance Materials: Attic stock requirements for finish and material items (such as flooring, wall covering, ceiling tiles, bathroom accessories and door hardware, or other items that require specific color, pattern, or stylistic match) shall be as defined in the individual specification section for applicable materials. If a greater quantity is not defined elsewhere in the specifications, the minimum attic stock quantity shall be 3%.

B. Exterior Materials: Attic stock is not required for exterior finish materials unless defined elsewhere in the specifications.

2.03 SPARE PARTS

A. The Owner’s property manager or maintenance supervisor for the Project building is responsible for the acceptance and storage of spare parts.

B. Items included with the purchase of materials or equipment that are considered spare or replacement parts are the property of the owner and shall be submitted to the area for acceptance and storage.

C. Installation aids, transportation tools and all items that are not deemed as spare parts shall be disposed of per Owner’s waste disposal policies, or may be retained by the Contractor.

PART 3 - NOT USED

END OF SECTION 01 78 46

SECTION 01 7900 - DEMONSTRATION AND TRAINING

PART 1 - GENERAL

1.1 SUMMARY

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

1. Demonstration of operation of systems, subsystems, and equipment.
2. Training in operation and maintenance of systems, subsystems, and equipment.

B. See Divisions 2 through 33 Sections for specific requirements for demonstration and training for products in those Sections.

1.2 SUBMITTALS

A. Instruction Program: Submit two copies of outline of instructional program for demonstration and training, including a schedule of proposed dates, times, length of instruction time, and instructors' names for each training module. Include learning objective and outline for each training module.

1.3 QUALITY ASSURANCE

A. Facilitator Qualifications: A firm or individual experienced in training or educating maintenance personnel in a training program similar in content and extent to that indicated for this Project, and whose work has resulted in training or education with a record of successful learning performance.

B. Instructor Qualifications: A factory-authorized service representative, complying with requirements in Division 1 Section "Quality Requirements," experienced in operation and maintenance procedures and training.

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

PART 2 - PRODUCTS

2.1 INSTRUCTION PROGRAM

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

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

1. Basis of System Design, Operational Requirements, and Criteria: Include system and equipment descriptions, operating standards, regulatory requirements, equipment function, operating characteristics, limiting conditions, and performance curves.
2. Documentation: Review emergency, operations, and maintenance manuals; Project Record Documents; identification systems; warranties and bonds; and maintenance service agreements.
3. Emergencies: Include instructions on stopping; shutdown instructions; operating instructions for conditions outside normal operating limits; instructions on meaning of warnings, trouble indications, and error messages; and required sequences for electric or electronic systems.
4. Operations: Include startup, break-in, control, and safety procedures; stopping and normal shutdown instructions; routine, normal, seasonal, and weekend operating instructions; operating procedures for emergencies and equipment failure; and required sequences for electric or electronic systems.
5. Adjustments: Include alignments and checking, noise, vibration, economy, and efficiency adjustments.
6. Troubleshooting: Include diagnostic instructions and test and inspection procedures.
7. Maintenance: Include inspection procedures, types of cleaning agents, methods of cleaning, procedures for preventive and routine maintenance, and instruction on use of special tools.
8. Repairs: Include diagnosis, repair, and disassembly instructions; instructions for identifying parts; and review of spare parts needed for operation and maintenance.

PART 3 - EXECUTION

3.1 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.

C. Scheduling: Provide instruction at mutually agreed on times. For equipment that requires seasonal operation, provide similar instruction at start of each season.

1. Schedule training with Owner with at least seven days' advance notice.

2. Except for seasonal operation items, the owner prefers that all training be conducted between substantial completion and occupancy.

D. Evaluation: At conclusion of each training module, assess and document each participant's mastery of module by use of a written performance-based test.

END OF SECTION 01 8200

SECTION 03 30 00 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 DESCRIPTION

A. Basic specification: Perform work of this Section according to ACI 301-16, "Specifications for Structural Concrete", except as specifically modified herein.

B. Work included: All cast-in-place concrete work shown on the Drawings and required by these Specifications. Allow for the installation of cast-in items furnished under other Sections. Install anchor bolts for structural steel. Provide and install grout under steel column base plates and beam bearing areas. Provide and install dowels for masonry walls.

C. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other Sections and all Drawings for related work such as concrete pads, piers, curbs, and bases required for equipment of all trades. Coordinate dimensions and details of equipment being supplied, prior to placing concrete. Cooperate with other trades who will provide and install items of work (sleeves, piping, conduit, inserts, etc.) to be cast in the concrete. Place no concrete until all such items are in place.

1.3 QUALITY ASSURANCE

A. Reference standards:
1. ACI 301, Specifications for Structural Concrete
2. ACI 318, Building Code Requirements for Structural Concrete.
3. ACI 117, Specification for Tolerances for Concrete Construction and Materials
4. ACI 347R, Guide to Formwork for Concrete.
5. ACI 302.1R, Guide to Concrete Floor and Slab Construction.
6. “Placing Reinforcing Bars", CRSI & WCRSI Recommended Practices.
7. ACI 439.5R, Comprehensive Guide for the Specification, Manufacture and Construction Use of Welded Wire Reinforcement.
8. ACI 304R, Guide for Measuring, Mixing, Transporting, and Placing Concrete.
9. ACI 305.1, Specification for Hot Weather Concreting.
10. ACI 306R, Guide to Cold Weather Concreting.
11. ACI Field Reference Manual, SP-15.

1.4 SUBMITTALS

A. Submit a mix design for each type of concrete mix required in accordance with ACI 301, Section 1.5.
   1. Acceptable methods of determining concrete proportions shall be in accordance with one of the following methods per ACI 301, Section 4:
      a. Establish based on previous field strength test data with standard deviation calculations.
      b. Establish based on trial mixtures with tested strength data relative to each mix design.

      In either case, provide accurate test data within allowable time periods indicated in ACI 301. Incorrect or missing data will cause for rejection of submittals.

B. Submit Placing Drawings for all reinforcing. Indicate strength, size, and details of all bar reinforcing, and style and specification of all welded wire fabric. Details must indicate clear cover used to determine chair heights.

C. Submit shop drawings for all formwork and shoring. Formwork design shall follow the guidelines of ACI 347 and ACI 347.2R. Shop drawings shall indicate sequence of form removal and reshoring for each type of construction. Include minimum concrete strengths for each reshored level at time of form stripping and concrete placement. Provide calculations sealed by a professional engineer registered in the applicable state of project location.

D. Submit test data for aggregates proposed for use, indicating source and compliance with specification requirements.
   1. Submit blended aggregate mix gradation data for review in all mixes which utilize blended aggregates.

E. Submit aggregate sample for exposed aggregate floors and sidewalks, and proposed procedure for exposing the aggregate.

F. Submit product literature for admixtures and curing compounds proposed for use.

G. Submit product literature on all proprietary materials including joint systems, waterstops, hooked anchorage systems, sealers, and patching compounds.

H. For formed slabs and slabs on metal deck, provide a proposed layout of construction joints and placement methods to verify construction live load used in the design of supporting framing members will not require additional shoring or re-design by the Engineer of Record.

I. Sustainability Submittal Requirements: Refer to Section 01 81 13 for submittal requirements.
   1. Submit product data and documentation that indicates fly-ash and ground granulated blast furnace slag materials having post-consumer and pre-consumer recycled content that conforms to the requirements to obtain LEED credits.

2. Submit product data and documentation that indicates reinforcing steel materials have post-consumer and pre-consumer recycled content that conforms to the requirements to obtain LEED credits.
   a. Provide steel reinforcing and welded wire fabric products that have a post-consumer recycled content plus one-half of pre-consumer recycled content of not less than 60 percent
3. Submit product data and documentation that identifies material costs for each type of material provided and includes location of extraction and manufacture of materials that conforms to the requirements to obtain the LEED credits.
   a. All cement materials shall be extracted, processed, and manufactured within a radius of 500 miles from the project site.
   b. Fly Ash and GGBF Slag materials shall be extracted, processed, and manufactured within a radius of 500 miles from the project site
   c. Steel for reinforcing shall be extracted, processed, and manufactured/fabricated within a radius of 500 miles from the project site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cement: Portland Cement, ASTM C150, Type I or Type II, ASTM C1157, Type LH or GU, or ASTM C595 Type IL. All cement to be from the same mill.

B. Supplementary Cementitious Materials
   1. Fly Ash: ASTM C618, Type C or F
   2. Ground Granulated Blast-Furnace Slag, GGBF Slag: ASTM C989, Grade 100 or 120
   3. Silca Fume, Microsilica: ASTM C1240

C. Water: Potable.

D. Aggregates:
   1. Normal weight aggregates: conform to ASTM C33, (4.2.1.2).
   2. Light weight aggregates, fine and coarse: conform to ASTM C330, (7.2.1).
   3. Coarse aggregate:
      a. Topping slabs on precast concrete deck and fill on stair pans: Gradation #8.
      b. All other classes: Gradation #57.
      c. A blended aggregate mix may be used at the Contractor/Suppliers' discretion.
   4. For architecturally exposed concrete, use a single source of uniform quality throughout the work.
   5. Use crushed limestone coarse aggregate for all slabs and exterior exposed concrete.

E. Admixtures, where required or permitted per ACI 301, Section 4:
   1. Water-Reducing: ASTM C494, Type A or D.

2. Mid-Range Water-Reducing admixture: ASTM C494, Type A.
3. Air-entraining: ASTM C260 (4.2.1.4).
4. High-Range Water-Reducing admixture (Superplasticizer): ASTM C494, Type F or G.
5. Non-Chloride, Non-Corrosive accelerator: ASTM C494, Type C or E.
6. Fly Ash: ASTM C618, Type C or F.
7. Ground Granulated Blast-Furnace Slag, GGBF Slag: ASTM C989.
8. Calcium Chloride and admixtures containing more than 0.06% chloride ions are NOT permitted.
9. Use of admixtures other than those listed will be permitted only when approved prior to bid.

F. Reinforcing:
1. Deformed bars - Uncoated: ASTM A615 or A706. Minimum yield strength to be 60 ksi.
2. Deformed bars – Epoxy Coated. ASTM A615, A616, A617, or A706. Minimum yield strength to be 60 ksi. Epoxy coated in accordance with the requirements of ASTM A775 or A934.
3. Welded Wire Fabric:
   a. Plain welded wire reinforcement: ASTM A1064. Provide in sheet form for all uses other than slabs-on-grade. Minimum yield strength is to be 65 ksi.
   b. Deformed welded wire reinforcement: ASTM A1064. Minimum yield strength is to be 70 ksi.
   c. Lap sheets a minimum distance of cross wire spacing plus two inches.
4. Deformed joint dowel bars: ASTM A615, Grade 60, plain steel bars, cut true to length with square ends.
5. Smooth joint dowel bars: ASTM A36, plain steel bars, cut true to length with square ends.
6. Reinforcing support accessories:
   a. Provide reinforcement accessories, consisting of bar supports, spacers, hangers, chairs, ties, and similar items as required for spacing, assembling, and supporting reinforcement in place. Conform with CRSI RB4.1 and Manual of Standard Practice and the following requirements:
   b. For footings, grade beams, and slabs on grade, provide supports with precast concrete or mortar bases or plates or horizontal runners where wetted base materials will not support chair legs.
   c. For exposed-to-view concrete surfaces, where legs of supports are in contact with forms or are in close proximity to finish surfaces, provide supports with legs which are galvanized, plastic-protected, or stainless steel.
   d. For galvanized reinforcement, provide all galvanized accessories
   e. For epoxy-coated reinforcement, provide accessories which are nylon-, epoxy, or plastic coated
7. Shear stud rails: ASTM A1044
   a. Studs: Minimum yield strength to be 51 ksi. Minimum ultimate strength to be 65 ksi.
   b. Rails, when used as stud anchorage: Minimum yield strength to be 44 ksi. Minimum ultimate strength to be 65 ksi.

8. Structural synthetic fiber reinforcement: Structural fibers shall be a coarse monofilament or self-fibrillation, polypropylene / polyethylene blend in accordance with ASTM C1116, Paragraph 4.1.3, Type III. Structural fibers shall have a minimum tensile strength of 73 to 80 ksi, have a minimum length of 1-1/2 inches, thickness of 0.015 inches, and a width of 0.045 inches.

G. Mechanical Reinforcing Splices: All mechanical splices must develop $1.25f_y$ of the reinforcing being spliced.
1. Welded Lap Splice: Welding of all non-prestressed bars shall conform to the requirements of AWS D1.4. Provide mill test reports of reinforcing bars to demonstrate compliance.
2. Proprietary coupling devices. Provide proprietary testing reports demonstrating compliance to strength requirements.

H. Premolded expansion joint filler: ASTM D1751.

I. Curing and Sealing Compound (VOC Compliant, 350 g/l): Liquid type membrane-forming curing compound, clear styrene acrylate type complying with ASTM C1315, Type I, Class B, 25% solids content minimum. Moisture loss shall be not more than 0.40 kg/m^2 when applied at 300 ft^2/gal. Manufacturers' certification is required. Do not apply to surfaces that are to receive subsequent cementitious toppings, sealers, hardeners, ceramic tile resilient flooring, vinylbacked carpet, wood, terrazzo, epoxy or urethane overlays or adhesives, or other coating or finishing products. Subject to project requirements, provide one from the following manufacturers:
1. BASF Construction Chemicals.
2. Euclid Chemical Company.
3. W.R. Meadows

J. Curing Compound (Strippable): The compound shall conform to ASTM C309 and is to be used on slabs that are to receive subsequent applied finishes and where noted on the drawings. Install in strict accordance with the manufacturer's recommendations and supervision. Verify compound is compatible with the applied finish prior to placement. Subject to project requirements, provide one from the following manufacturers:
1. BASF Construction Chemicals.
2. Euclid Chemical Company.
3. W.R. Meadows

K. Curing compound for the parking area slabs on grade: ASTM C1315, Type 1, Class A, and AASHTO M148. Compound must contain a fugitive dye. Subject to project requirements, provide one from the following manufacturers:
1. BASF Construction Chemicals.
2. Euclid Chemical Company.
3. W.R. Meadows.

L. Penetrating Sealer for Elevated Parking Decks: Meets or exceeds performance requirements of NCHRP 244 and have minimum 40% silane content. Subject to project requirements, provide one from the following manufacturers:
1. Euclid Chemical Company.

2. Kaufman Company.
3. Sika Corporation.

M. Grout for masonry core fill: ASTM C476, coarse type.

N. Grout under steel base plates and bearing plates: Non-shrinking, non-metallic, with minimum 28-day strength of 5,000 psi, when mixed to a fluid consistency. Subject to project requirements, provide one from the following manufacturers:
1. BASF Construction Chemicals.
2. Euclid Chemical Company.
3. Kaufman Company.

O. Vapor Retarder:
1. Conform to ASTM E1745 “Standard Specification for Plastic Water Vapor Retarders Used in Contact with Soil or Granular Fill under Concrete Slabs”, Class A.
2. Vapor retarders are required under all slabs on grade which are to receive moisture-sensitive floor covering, and in humidity-controlled areas. Vapor retarders are not required under industrial slabs on grade nor under those in non-humidity-controlled areas.
3. Vapor retarder shall be installed in accordance with ASTM E1643 Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill under Concrete Slabs. The vapor retarder/barrier shall be a minimum of 10 mils thick and placed directly on the granular fill, below the concrete floor slab. Lap joints a minimum of 6 inches and seal with manufacturer’s recommended tape or adhesive.

P. Granular fill below slabs on grade: Provide as recommended in project specific soils report. If soils report is not provided for project, use 4” deep of compacted ODOT 304 or approved equivalent AASHTO dense graded base course. Provide ASTM D448 size #57 stone under slabs-on-grade where radon evacuation is anticipated.

Q. Waterstops: Provide waterstops at all construction joints and other joints in all foundation walls below grade and where shown on the drawings. Size to suit joints. Provide either premolded polyvinylchloride or swellable type.
1. Premolded, flexible, polyvinylchloride, with center bulb. CRD C572
2. Rubber and Swellable Clay CRD C513

R. Structural Bonding Compound: Epoxy adhesive, 100% solids, two-component material suitable for use on dry or damp surface. Subject to project requirements, provide one from the following manufacturers:
1. Euclid Chemical Company.
2. Kaufman Company.
3. Sika Corporation.

S. Patching Compound, Epoxy Type: 100% solids, suitable for use on dry or damp surface. Subject to project requirements, provide one from the following manufacturers:
1. Euclid Chemical Company.
2. Sika Corporation.

3. W.R. Meadows

T. Patching Compound, Cementitious Type: Subject to project requirements, provide one from the following manufacturers:
   1. Euclid Chemical Company.
   2. Sika Corporation.
   3. W.R. Meadows

U. Curing sheets for wet curing – the following materials are approved:
   1. Sisalcraft Sk-10 (C171).
   2. Burlap
   3. Filter Fabric (8-ounce minimum)
   4. Visqueen plastic, 8 mils minimum.
   5. Bur-lene curing blankets.

V. Concrete Inserts:
   1. Dovetail Inserts
      a. Heckman #100 Inserts; hot-dip galvanized.
   2. Brick Ledge Inserts:
      a. Hohmann & Barnard LW-340 Inserts; hot-dip galvanized.

W. Frictionless Bearing Pads:
   1. Frictionless bearing pads shall be a nominal 3/32" glass filled virgin Tetrafluoroethylene (TFE) conforming to ASTM D 4745 with a 10-gauge A36 steel backing plate factory bonded with a tested epoxy performed in a heated bonding process under a controlled pressure. Provide one sliding pad tack welded to the lower supporting surface and one tack welded to the upper surface. Unless detailed otherwise on the drawings, the upper element shall be larger than the lower element on all sides by the amount of the expansion joint width shown on the drawings. The lower frictionless bearing pads shall be a nominal 1/16" glass filled virgin Tetrafluoroethylene (TFE) conforming to ASTM D 4745 with a 10-gauge A36 steel backing plate factory bonded with a tested epoxy performed in a heated bonding process under a controlled pressure. The upper frictionless bearing pad shall be a 20-gauge stainless steel sheet (RMS<20) resistance welded to a 10-gauge A36 steel backing plate. The lower sliding pad shall be tack welded to the lower supporting surface and the upper pad tack welded to the upper surface. Unless detailed otherwise on the drawings, the upper element shall be larger than the lower element on all sides by the amount of the expansion joint width shown on the drawings.
   2. Design: The pad size and design shall conform to 1998 AASHTO "LRFD Bridge Design Specifications," Section 14. Design bearing pressure under total service load shall not exceed the manufacturer’s recommendation. If Neoprene is used the compressive load shall be limited to 800 psi.
   3. Corrosion Resistance: Frictionless bearing pads for exterior or exposed usage shall be manufactured for use in an exposed climate of heat, cold, moisture, and ultraviolet rays. All backing steel in an exposed or open environment shall be shop painted with a zinc rich paint or field painted with "ZRC Cold Galvanizing Compound".

X. Neoprene bearing pads:

1. 100% virgin chloroprene meeting AASHTO Specifications. Shore A hardness of 60, unless noted otherwise.

2.2 MIXES

A. The following mixes of concrete are required:

Mix Usage	f'_c at 28 days	Exposure Class	Maximum Water Cementitious Ratio	Air Content
Lean Concrete, & Mud Slabs	1,500 PSI	F0	---	---
Footings & Interior Column Piers	3,500 PSI	F1	0.55	optional
Interior Slabs on Grade	3,500 PSI	F0	0.50	optional
Interior Slabs on Grade Which Receive Moisture-Sensitive Floor Coverings	4,000 PSI	F0	0.45	optional
Interior Slabs on Metal Deck	3,500 PSI	F0	0.45	optional
Exterior, Unreinforced Slabs on Grade and Exterior Concrete Not Subjected to Deicers	4,500 PSI	F2	0.45	5%-7%

Concrete Mix Notes:

1) Exposure class requirements are achieved through the F'c, w/cm, and air content requirements provided to ensure adequate durability conforms to Freeze/Thaw exposures (F) or Corrosive exposures (C).
2) For all slab mixes, provide a minimum cementitious content of 520 lbs.
3) Use No. 8 coarse aggregate for concrete topping on precast concrete deck and metal stair pan fill.
4) Provide 3 pounds per cubic yard of collated fibrillated polypropylene fibers for topping on precast concrete plank.
5) Slump: Maximum 5" for all members. If a superplasticizer is used, initial slump to be 3", increased to 8" maximum after addition (at the job site) of the superplasticizer.
6) Fly ash is permitted in all mixes but shall not exceed 25% of cement weight indicated above and can be included in the water-to-cementitious ratio.
7) Ground granulated blast-furnace slag is permitted in all mixes but shall not exceed 35% of the cement weight indicated above and can be included in the water-to-cementitious ratio.
8) Silica fume (microsilica) is permitted in all mixes but shall not exceed 10% of the cement weight indicated above and can be included in the water-to-cementitious ratio.
9) Total supplemental cementitious material shall not exceed 35% of the total cement weight.
10) Mixes to be pumped are to be so identified on the mix design submittal. All pumped mixes are to have a mid-range or high-range water reducer.
11) Concrete for slabs on grade must include a mid-range or high-range plasticizer.
12) All admixtures (other than superplasticizer) are to be added at the batch plant. Superplasticizers, designed for addition to the mix at the plant, may be added at the batch plant with verification from the Engineer of Record and verification that the water-to-cement ratio has not been exceeded.

13) Maximum water-soluble chloride ion content in Non-Prestressed concrete shall not be more than the ACI limits set forth for defined corrosion classes. For all other concrete, the maximum water-soluble chloride ion content shall not be more than 0.06 percent (by weight) of the weight of cement as determined by ASTM C1218.
14) Lightweight concrete shall have an equilibrium density, as determined by ASTM C567, between 90 and 115 pounds per cubic foot.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Verify that excavations are free of water and ice, are of the required dimensions, and have been approved by the Soils Engineer, prior to placing concrete.

B. Determine field conditions by actual measurement.

C. Notify Architect not less than 24 hours in advance of placing concrete. Place concrete only when Construction Manager is present, unless this requirement is specifically waived.

3.2 FORMWORK AND REINFORCING

A. All formwork shall follow the guidelines of ACI 347R resulting in final formed surfaces within the tolerances of ACI 117.

B. Footings may be cast against earth cuts when soil conditions permit.

C. Removal of forms and shoring:
1. Remove no forms within 24 hours after placement.
2. Shoring is to remain in place until concrete reaches its design strength. Windsor Penetrometer is to be used to verify in-place strength if forms are removed prior to 28 days after casting concrete.

D. Reinforcing:
1. Welding of reinforcing is prohibited, except where shown.
2. Use plastic-tipped or stainless-steel bar supports for surfaces exposed to view in finished structure.

3.3 EMBEDDED ITEMS

A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
1. Install all embeds shown on contract documents, including but not limited to: headed stud embeds, anchor bolts, brick ledge inserts, and dovetail anchor slots.

2. Install sleeves for mechanical, electrical, and plumbing penetrations.
3. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.

B. Aluminum conduit shall not be installed in concrete.

3.4 DELIVERY AND PLACEMENT

A. Preparation before placement:
1. Remove all debris from forms and deck. Clean steel deck of grease, oil, and other substances that would reduce bond to concrete.
2. Standing water shall be removed from place of deposit before concrete is placed.
3. Do not use additives or salts to remove ice. Non-chloride deicers may be used.
4. In cold weather, comply with ACI 306R; maintain temperature of forms and reinforcing within a range of 55 - 90 degrees F.
5. In hot weather, comply with ACI 305.1.
6. Prior to placing topping slabs on Precast Concrete Hollow Core Planks, thoroughly dampen the precast surface but do not leave standing water. Immediately before placing topping, re-dampen the surface and broom on a coat of thin neat cement grout. Apply grout only to small enough areas so that it will not begin to set or dry before placement of the topping slab.
   a. In lieu of neat cement grout, a manufactured bonding agent may be used. The bonding agent must be integrally colored to show the extent of application. Apply by brush or spray, at recommended rates, in accordance with the manufacturer’s directions.

B. Delivery is to conform to ASTM C94.
1. Delivery tickets to contain the following, in addition to the information required by C94:
2. Reading of revolution counter at first addition of water.
3. Type and brand of cement and supplementary cementitious materials.
4. Cementitious content.
5. Total water content by producer.
6. Maximum size of aggregate.
7. Secure Architect's written approval if non-agitating type equipment is to be used for transportation.
8. ASTM C94 requires discharge within 1-1/2 hours or 300 revolutions; whichever comes first, after the introduction of water to cement and aggregates, or the introduction of cement to the aggregates. Architect may require an earlier discharge during hot weather, or when high-early strength cement is being used.

C. Water addition at the site will not be permitted, except when the approved mix design has been formulated to allow for on-site addition of water. Water may only be added by personnel authorized by the Architect/Engineer and Concrete Producer.

D. Conveying: Keep delivery carts and buggies on runways; do not allow them to bear on reinforcing or uncured concrete.

E. Placement.
1. Place within 6 feet of final position. Spreading with vibrators is prohibited.
2. In walls and columns, deposit concrete in uniform horizontal layers, with a maximum depth of 4 feet (18 inches for architectural concrete).
3. Maximum free fall without chutes or elephant trunks to be 5 feet (3 feet for architectural concrete).
4. Place concrete continuously to a designed joint such that no concrete will be placed on concrete which has hardened sufficiently to cause the formation of cold joints or planes of weakness.
5. Concrete shall be consolidated per guidelines in ACI 309.2R.

F. Records: Keep a complete log of pours, including date, location, quantity, weather, and identification of test cylinders for each pour.

3.5 JOINTING

A. Interior slabs on grade:
1. Locate control (contraction) joints as shown on the Drawings. In the absence of information on Drawings, locate at openings, walls, columns, grid lines, and inside corners. The maximum spacing of contraction (control) joints, for reinforced and unreinforced slabs, is to be 6 times the square root of the slab thickness (i.e. for a 4-inch slab the maximum spacing is 12 feet). Cut joints ¼ times the slab thickness. The Soff-Cut Saw shall be used immediately after final finishing. A conventional saw shall be used as soon as possible without dislodging aggregate. Schedule slab pours and saw-cutting operations such that sawing is completed prior to onset of shrinkage cracking.
2. Provide isolation joints at columns (½ inch thick) and at walls (⅛ inch thick). Where isolation joint will be exposed to view, set top of joint filler below top of slab a distance equal to the filler thickness, to receive sealant. Where not exposed to view, set top of filler flush with top of slab.

B. Exterior slabs on grade: Locate joints as shown on Drawings. In the absence of information on Drawings, provide the following (for sidewalks only):
1. Expansion joints: Full depth, with ½ inch joint filler, where slabs abut vertical surfaces at intersections of sidewalks, at abrupt changes in width, and at a spacing not exceeding 30 feet.
2. Control joints: Tooled, 1 inch deep, 4'-0" to 6'-0" on center between expansion joints.

C. Above-grade, Below-grade and foundation walls: Locate contraction joints at maximum spacings of 60’-0” on center, except as approved otherwise. Provide horizontal reinforcing separation, doweling of adjacent placements, and v-grooves each face per details on Structural Drawings. Construction joints in walls shall be submitted to EOR for review and approval.

D. Construction Joints in supported slabs and slabs on metal deck: Locate per Contract Document requirements, and in accordance with ACI 301 section 2.2.2.5. Submit proposed construction joint locations for review prior to proceeding with construction.

3.6 FINISHES

A. Schedule of finishes on flatwork per ACI 301, section 5 is as follows:
   1. Typical interior floor areas to receive carpet, resilient floor covering, or to remain exposed - troweled finish.
   2. Interior floor areas to receive terrazzo, quarry tile, or ceramic tile - floated finish.
   3. Exterior slabs - broom finish.
   4. Areas indicated on Drawings:
      a. Exposed aggregate.
      b. Non-slip.
      c. Liquid sealer/densifier – per manufacturer’s instructions, under direction of manufacturer’s representative. Use on all interior trowel finished slabs subject to small-wheeled vehicular traffic.
      d. Hardener - per manufacturer's instructions, under direction of manufacturer's representative.

B. Surfaces of floor slabs shall be finished to the following tolerances, per ACI 117:
   1. Minimum flatness of F(f) 30, and a minimum levelness of F(l) 20, are required for typical slabs on grade. Preceding values are average values to be obtained over a given area. Minimum local values (one-half bay) of F(f) 25 and F(l) 17 shall be obtained.
   2. Minimum flatness of F(f) 25 is required for elevated slabs. Preceding value is an average value to be obtained over a given area. Minimum local value (one-half bay) of F(f) 20 shall be obtained.

C. Determination of the flatness and levelness of a concrete slab shall be made on the day following placement of the first concrete pour. Tests shall be made in accordance with ASTM E115. After it is established that proper procedures are being utilized to obtain the desired results, flatness/levelness test shall be performed only as directed by the Owner.

D. Any bay not conforming to the above flatness and levelness requirements is subject to: repair, or removal; replacement; and retesting; at no expense to the Owner.

E. “F Numbers" shall be submitted to the Owner and Architect immediately after they are determined by the testing laboratory.

3.7 CURING AND PROTECTION

A. Curing:

1. Interior slab areas that will receive non-moisture sensitive terrazzo, ceramic tile, quarry tile, or a liquid sealer/densifier, are to be moist-cured for a minimum of 7 days, without the use of a curing compound.
2. Interior slab on grade areas which will receive moisture sensitive floor coverings are to be cured with plastic sheeting, conforming to ASTM C171, for 7 days. Edges and joints are to be sealed. Rewetting of the slab at any time during construction should be avoided.
3. All other slab areas which will receive non-moisture sensitive floor coverings may be either moist-cured or receive an application of curing compound, except that when concrete above grade is placed in the open, and the air temperature exceeds 60 ºF, the concrete is to be moist-cured for the first 24 hours.
4. Whichever curing method is used, it is to commence immediately after placement. Do not allow curing to be delayed overnight.
5. Prevent excessive moisture loss from formed surfaces. If forms are removed before 7 days have elapsed, cure the formed surfaces by moist-curing or application of curing compound for the remainder of the curing period.

B. Protection:
1. When air temperature during placement is less than 40 ºF, or will be within 24 hours, temperature of concrete as placed is to be between 50 ºF and 90 ºF (55 ºF and 90 ºF for sections less than 12 inches thick) and a non-chloride accelerator shall be used. Maintain concrete temperature within these limits for the full curing period of 7 days.
2. When air temperature during placement is greater than 80 degrees, a water-reducing retarder shall be used. Maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.

3.8 CLEANING AND REPAIR

A. Repair any slabs that do not meet the finish requirements. The Architect will determine whether grinding, filling of cracks, or patching and leveling procedures are required.

B. For slabs that are dusting, or showing other signs of improper curing, any corrective measures attempted will be subject to prior approval of the Architect and will be performed at Contractor's expense. These may include additional applications of sealer/densifier, or grinding, or covering with specified repair topping.

C. Immediately prior to final acceptance, remove from all interior and exterior surfaces that are exposed to view, any stain-producing elements, such as pyrites, nail, wire, reinforcing steel, and form ties.

D. Remove all stains completely. Use of weak acids or patented cleaners is acceptable, but surface is to be completely neutralized after use.

E. All repairs shall conform to ACI 301, Section 5.3.7 except that the specified bonding com- pounds, cementitious, or epoxy repair materials must be used. Repair procedures must be submitted and reviewed by the Engineer of Record.

F. As-cast formed finishes shall be comply with the following:
   1. Concrete surfaces not exposed to view (Surface Tolerance Class D per ACI 117)
      a. Patch voids larger than 1-1/2" wide or ½" deep.
      b. Remove projections larger than 1".
   2. Concrete surfaces exposed to view (Surface Tolerance Class C per ACI 117)
      a. Patch voids larger than ¾" wide or ½" deep.
      b. Remove projections larger than ½".
      c. Patch tie holes.

G. Failure of concrete topping to bond to substrate (as evidence by a hollow sound when tapped), or disintegration or other failure of topping to perform as a floor finish, will be considered failure of materials and workmanship. Repair or replace toppings in areas of such failures, as directed.

3.9 ACCEPTANCE

A. Concrete work with serious honeycombing, form misalignment, or other deviation from Contract requirements is subject to rejection per ACI 301, Section 1.

B. When observations or tests indicate that the Contract requirements have not been met, the Contractor is to bear the costs of any additional testing and analysis to determine acceptability and also the cost of removal and replacement, if such is required per ACI 301, Section 1.

3.10 FIELD QUALITY CONTROL

A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the jurisdiction.

B. All tests and inspection shall be per ACI 301, Section 1.6

END OF SECTION 03 30 00

SECTION 042613 - MASONRY VENEER

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Clay masonry units.
2. Concrete masonry units.
3. Mortar materials.
4. Ties and anchors.
5. Embedded flashing.
6. Accessories.
7. Mortar mixes.

B. Products Installed, but Not Furnished, under This Section:

1. Steel lintels in masonry veneer.
2. Steel shelf angles for supporting masonry veneer.

C. Related Requirements:

1. Section 014339 "Mockups" for integrated exterior mockup requirements.

2. Section 042200 "Concrete Unit Masonry" for full-size, single-wythe CMU assemblies.

3. Section 076200 "Sheet Metal Flashing and Trim" for exposed sheet metal flashing and for furnishing manufactured reglets installed in masonry joints.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: For the following:

1. Masonry Units: Indicate sizes, profiles, coursing, and locations of special shapes.
2. Fabricated Flashing: Detail corner units, end-dam units, and other special applications.

C. Samples for Initial Selection:

1. Colored Mortar: Full range of manufacturer's standard colors.
2. Aggregate for Mortar: Range of aggregate colors for colored-aggregate mortar.
3. Weep/cavity vents.

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D. Sustainable Design Submittals:

1. Third-Party Certifications: For each product.
2. Third-Party-Certified Life-Cycle Assessment: For each product.

1.3 QUALITY ASSURANCE

A. Installer Qualifications: All masonry flashing installers must complete the International Masonry Institute Flashing Upgrade training course.

B. Testing Agency Qualifications: Qualified in accordance with ASTM C1093 for testing indicated.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Store masonry units on elevated platforms in a dry location. If units are not stored in an enclosed location, cover tops and sides of stacks with waterproof sheeting, securely tied. If the units become wet, do not install until they are dry.

B. Store cementitious materials on elevated platforms, under cover, and in a dry location. Do not use cementitious materials that have become damp.

C. Store aggregates where grading and other required characteristics can be maintained and contamination avoided.

D. Deliver preblended, dry mortar mix in moisture-resistant containers. Store preblended, dry mortar mix in delivery containers on elevated platforms in a dry location or in covered weatherproof dispensing silos.

E. Store masonry accessories, including metal items, to prevent corrosion and accumulation of dirt and oil.

1.5 FIELD CONDITIONS

A. Protection of Masonry: During construction, cover tops of veneer, projections, and sills with waterproof sheeting at end of each day's work. Cover partially completed masonry when construction is not in progress.

1. Extend cover a minimum of **24 inches** down face of veneer, and hold cover securely in place.

B. Stain Prevention: Prevent grout, mortar, and soil from staining the face of masonry. Immediately remove grout, mortar, and soil that come in contact with masonry.

1. Protect base of walls from rain-splashed mud and from mortar splatter by spreading coverings on ground and over wall surface.
2. Protect sills, ledges, and projections from mortar droppings.
3. Protect surfaces of window and door frames, as well as similar products with

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painted and integral finishes, from mortar droppings.

4. Turn scaffold boards near the wall on edge at the end of each day to prevent rain from splashing mortar and dirt onto completed masonry.

C. Cold-Weather Requirements: Do not use frozen materials or materials mixed or coated with ice or frost. Do not build on frozen substrates. Remove and replace masonry veneer damaged by frost or by freezing conditions. Comply with cold-weather construction requirements contained in TMS 402/602.

1. Cold-Weather Cleaning: Use liquid cleaning methods only when air temperature is **40 deg F** and higher and will remain so until masonry has dried, but not less than seven days after completing cleaning.

D. Hot-Weather Requirements: Comply with hot-weather construction requirements contained in TMS 402/602.

PART 2 - PRODUCTS

2.1 CLAY MASONRY UNITS

A. General: Provide shapes indicated and as follows, with exposed surfaces matching finish and color of exposed faces of adjacent units.

1. For ends of sills and caps and for similar applications that would otherwise expose unfinished brick surfaces, provide units without cores or frogs and with exposed surfaces finished.
2. Provide special shapes for applications where stretcher units cannot accommodate special conditions, including corners, movement joints, bond beams, sashes, and lintels requiring brick of size, form, color, and texture on exposed surfaces that cannot be produced by sawing where shapes produced by sawing would result in sawed surfaces being exposed to view.

2.2 CONCRETE MASONRY UNITS

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

1. Provide special shapes for lintels, corners, jambs, sashes, movement joints, headers, bonding, and other special conditions.

B. Concrete Masonry Unit Admixtures:

1. Integral Water Repellent: Liquid polymeric, integral water-repellent admixture that does not reduce flexural bond strength. Units made with integral water repellent, when tested in accordance with ASTM E514/E514M as a wall assembly made with mortar containing integral water-repellent manufacturer's mortar additive, with test period extended to 24 hours, will show no visible water or leaks on the back of test specimen.

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a. Location: For exposed units.

2.3 MORTAR MATERIALS

A. Portland Cement: ASTM C150/C150M, 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.

1. Alkali content will not be more than 0.1 percent when tested in accordance with ASTM C114.

B. Hydrated Lime: ASTM C207, Type S.

C. Portland Cement-Lime Mix: Packaged blend of portland cement and hydrated lime containing no other ingredients.

D. Colored Mortar: Packaged blend made from [**portland cement-lime mix**][**or**][**masonry cement**] and mortar pigments, all complying with specified requirements, and containing no other ingredients.

1. Formulate blend as required to produce color indicated or, if not indicated, as selected from manufacturer's standard colors.
2. Pigments do not exceed 10 percent of portland cement by weight.
3. Pigments do not exceed 5 percent of [**masonry cement**][**or**][**mortar cement**] by weight.

E. Aggregate for Mortar: ASTM C144.

1. For mortar that is exposed to view, use washed aggregate consisting of natural sand or crushed stone.
2. For joints less than **1/4 inch** thick, use aggregate graded with 100 percent passing the **No. 16** sieve.
3. White-Mortar Aggregates: Natural white sand or crushed white stone.
4. Colored-Mortar Aggregates: Natural sand or crushed stone of color necessary to produce required mortar color.

F. Water: Potable.

2.4 TIES AND ANCHORS

A. General: Ties and anchors extend at least **1-1/2 inches** into veneer but with at least a **5/8-inch** cover on outside face.

B. Materials: Provide ties and anchors specified in this article that are made from materials that comply with the following unless otherwise indicated:

1. Mill-Galvanized, Carbon Steel Wire: ASTM A1064/A1064M, with ASTM A641/A641M, Class 1 coating.
2. Hot-Dip Galvanized, Carbon Steel Wire: ASTM A1064/A1064M, with ASTM

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A153/A153M, Class B coating.

3. Stainless Steel Wire: ASTM A580/A580M, [**Type 304**][**Type 316**].
4. Galvanized-Steel Sheet: ASTM A653/A653M, Commercial Steel, **G60** zinc coating.
5. Steel Sheet, Galvanized after Fabrication: ASTM A1008/A1008M, Commercial Steel, with ASTM A153/A153M, Class B coating.
6. Stainless Steel Sheet: ASTM A240/A240M or ASTM A666, [**Type 304**][**Type 316**].

C. Corrugated-Metal Ties: Metal strips not less than **7/8 inch** wide with corrugations having a wavelength of **0.3 to 0.5 inch** and an amplitude of **0.06 to 0.10 inch** made from [**0.0336-inch- thick, steel sheet, galvanized after fabrication**][**0.0635-inch- thick, steel sheet, galvanized after fabrication**][**0.0312-inch- thick, stainless steel sheet**][**0.0625-inch- thick, stainless steel sheet**].

D. Adjustable Anchors for Connecting to Structural-Steel Framing: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Anchor Section for Welding to Steel Frame: Crimped **1/4-inch-** diameter, [**hot-dip galvanized steel**][**stainless steel**] wire. [**Mill-galvanized wire may be used at interior walls unless otherwise indicated.**]
2. Tie Section: Triangular-shaped wire tie made from [**0.187-inch-**][**0.25-inch-**] diameter, [**hot-dip galvanized steel**][**stainless steel**] wire. [**Mill-galvanized wire may be used at interior walls unless otherwise indicated.**]

E. Adjustable Anchors for Connecting to Concrete: Provide anchors that allow vertical or horizontal adjustment but resist tension and compression forces perpendicular to plane of wall.

1. Connector Section: Dovetail tabs for inserting into dovetail slots in concrete and attached to tie section; formed from [**0.060-inch- thick, steel sheet, galvanized after fabrication**][**0.105-inch- thick, steel sheet, galvanized after fabrication**][**0.062-inch- thick, stainless steel sheet**][**0.109-inch- thick, stainless steel sheet**].

    a. [**0.064-inch-**][**0.108-inch-**] thick, galvanized-steel sheet may be used at interior walls unless otherwise indicated.

2. Tie Section: Triangular-shaped wire tie made from [**0.187-inch-**][**0.25-inch-**] diameter, [**hot-dip galvanized steel**][**stainless steel**] wire. [**Mill-galvanized wire may be used at interior walls unless otherwise indicated.**]
3. Corrugated-Metal Ties: Metal strips not less than **7/8 inch** wide with corrugations having a wavelength of **0.3 to 0.5 inch** and an amplitude of **0.06 to 0.10 inch** made from [**0.0635-inch- thick steel sheet, galvanized after fabrication**][**0.0785-inch- thick steel sheet, galvanized after fabrication**][**0.1084-inch- thick steel sheet, galvanized after fabrication**][**0.0625-inch- thick, stainless steel sheet**][**0.0781-inch- thick, stainless steel sheet**][**0.1094-inch- thick, stainless steel sheet**] with [**dovetail**][**channel**] tabs for inserting into dovetail slots in concrete.

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a. [**0.064-inch-**][**0.079-inch-**][**0.108-inch-**] thick, galvanized sheet may be used at interior walls unless otherwise indicated.

F. Adjustable Masonry-Veneer Anchors:

1. General: Provide anchors that allow vertical adjustment but resist a **100 lbf** load in both tension and compression perpendicular to plane of wall without deforming or developing play in excess of **1/16 inch**.
2. Fabricate sheet metal anchor sections and other sheet metal parts from [**0.0785-inch- thick steel sheet, galvanized after fabrication**][**0.1084-inch- thick steel sheet, galvanized after fabrication**][**0.0781-inch- thick, stainless steel sheet**][**0.1094-inch- thick, stainless steel sheet**].
3. Fabricate wire ties from [**0.187-inch-**][**0.25-inch-**] diameter, [**hot-dip galvanized steel**][**stainless steel**] wire unless otherwise indicated.
4. Contractor's Option: Unless otherwise indicated, provide any of the adjustable masonry-veneer anchors specified.
5. Polymer-Coated, Steel Drill Screws for Steel Studs: ASTM C954 except manufactured with hex washer head and neoprene or EPDM washer, **No. 10** diameter by length required to penetrate steel stud flange with not less than three exposed threads, and with organic polymer coating with salt-spray resistance to red rust of more than 800 hours in accordance with ASTM B117.
6. Stainless Steel Drill Screws for Steel Studs: ASTM C954 except manufactured with hex washer head and neoprene or EPDM washer, **No. 10** diameter by length required to penetrate steel stud flange with not less than three exposed threads; either made from Type 410 stainless steel or made with a carbon steel drill point and 300 Series stainless steel shank.

2.5 EMBEDDED FLASHING

A. Preformed Corners, End Dams, and Seaming Shapes for Flashing: Flashing manufacturer's standard products or products recommended by flashing manufacturer for waterproofing openings.

B. Solder and Sealants for Sheet Metal Flashings: [**As specified in Section 076200 "Sheet Metal Flashing and Trim."**]

1. Solder for Stainless Steel: ASTM B32, [**Grade Sn60**][**Grade Sn96**], with acid flux of type recommended by stainless steel sheet manufacturer.

2. Elastomeric Sealant: ASTM C920, chemically curing [**urethane**][**polysulfide**][**silicone**] sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and remain watertight.

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

D. Termination Bars for Flexible Flashing:

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1. Material: Aluminum.
2. Size: [**0.075 by 1 inch**][**1/8 by 1 inch**][**1/8 by 1-1/8 inch**].

E. Termination Bars for Flexible Flashing, Flanged:

1. Material: Stainless steel sheet 0.019 by 1-1/2 inches.
2. Fabricate with a **3/8-inch** flange at top [**and bottom**].

2.6 ACCESSORIES

A. Compressible Filler: Premolded filler strips complying with ASTM D1056, Grade 2A1; compressible up to 35 percent; of width and thickness indicated; formulated from neoprene.

B. Weep/Vent Products: Use the following unless otherwise indicated:

1. Rectangular Plastic Weep/Vent Tubing: Clear butyrate, **3/8 by 1-1/2 by 3-1/2 inches** long.

C. Expanded Metal Lath: **3.4 lb/sq. yd.**, self-furring, diamond-mesh lath complying with ASTM C847. Fabricate from structural-quality, zinc-coated (galvanized) steel sheet complying with ASTM A653/A653M, **G60**.

D. Woven-Wire Lath: ASTM C1032/C1032M, fabricated into **1-1/2-inch** hexagonal-shaped mesh with minimum **0.0510-inch-** diameter, galvanized-steel wire.

E. Welded-Wire Lath: ASTM C933, fabricated into **2-by-2-inch** mesh with minimum **0.0625-inch-** diameter, galvanized-steel wire.

F. Lath Attachment Devices and Fasteners: Corrosion-resistant material and type required by ASTM C1063 for installations indicated.

G. Weep Screed: Fabricated from hot-dip galvanized steel sheet ASTM A653/ASTMA653M, **G60** zinc coating.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

1. For the record, prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

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3.2 INSTALLATION, GENERAL

A. Install all accessories in accordance with manufacturer's written instructions.

B. Leave openings for equipment to be installed before completing masonry. After installing equipment, complete masonry to match the construction immediately adjacent to opening.

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

D. Select and arrange units for exposed masonry veneer to produce a uniform blend of colors and textures. Mix units from several pallets or cubes as they are placed.

E. Matching Existing Masonry: Match coursing, bonding, color, and texture of existing masonry.

F. Wetting of Brick: Wet brick before laying if initial rate of absorption exceeds **30 g/30 sq. in.** per minute when tested in accordance with ASTM C67/C67M. Allow units to absorb water so they are damp but not wet at time of laying.

3.3 TOLERANCES

A. Dimensions and Locations of Elements:

1. For dimensions in cross section or elevation, do not vary by more than plus **1/2 inch** or minus **1/4 inch**.
2. For location of elements in plan, do not vary from that indicated by more than plus or minus **1/2 inch**.
3. For location of elements in elevation, do not vary from that indicated by more than plus or minus **1/4 inch** in a story height or **1/2 inch** 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 ft.**, or **1/2-inch** 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 ft.**, **1/4 inch in 20 ft.**, or **1/2-inch** maximum.
3. For vertical lines and surfaces, do not vary from plumb by more than **1/4 inch in 10 ft.**, **3/8 inch in 20 ft.**, or **1/2-inch** 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 ft.**, **1/4 inch in 20 ft.**, or **1/2-inch** maximum.
5. For lines and surfaces, do not vary from straight by more than **1/4 inch in 10 ft.**, **3/8 inch in 20 ft.**, or **1/2-inch** maximum.
6. For vertical alignment of exposed head joints, do not vary from plumb by more

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than **1/4 inch in 10 ft.**, or **1/2-inch** maximum.

7. For faces of adjacent exposed masonry units, do not vary from flush alignment by more than **1/16 inch** except due to warpage of masonry units within tolerances specified for warpage of units.

C. Joints:

1. For bed joints, do not vary from thickness indicated by more than plus or minus **1/8 inch**, with a maximum thickness limited to **1/2 inch**.
2. For exposed bed joints, do not vary from bed-joint thickness of adjacent courses by more than **1/8 inch**.
3. For head and collar joints, do not vary from thickness indicated by more than plus **3/8 inch** or minus **1/4 inch**.
4. For exposed head joints, do not vary from thickness indicated by more than plus or minus **1/8 inch**. [**Do not vary from adjacent bed-joint and head-joint thicknesses by more than 1/8 inch.**]
5. For exposed bed joints and head joints of stacked bond, do not vary from a straight line by more than **1/16 inch** from one masonry unit to the next.

3.4 INSTALLATION OF 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**][**stack bond**][**one-third running bond**][**Flemish bond**][**English bond**][**bond pattern indicated on Drawings**]; do not use units with less-than-nominal **4-inch** horizontal face dimensions at corners or jambs.

C. Stopping and Resuming Work: Stop work by stepping back units in each course from those in course below; do not tooth. When resuming work, clean masonry surfaces that are to receive mortar, remove loose masonry units and mortar, and wet brick if required before laying fresh masonry.

D. Built-in Work: As construction progresses, build in items specified in this and other Sections. Fill in solidly with masonry around built-in items.

E. Fill space between steel frames and masonry solidly with mortar unless otherwise indicated.

3.5 INSTALLATION OF MORTAR BEDDING AND JOINTING

A. Lay masonry units with face shells fully bedded in mortar and with head joints of depth equal to bed joints. At starting course, fully bed entire units, including area under cells.

1. At anchors and ties, fully bed units and fill cells with mortar as needed to fully embed anchors and ties in mortar.

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B. Solid Masonry Units: Lay units with completely filled bed and head joints; butter ends with sufficient mortar to fill head joints and shove into place. Do not deeply furrow bed joints or slush head joints.

C. Trim Units: Set [**stone**][**cast-stone**] trim units in full bed of mortar with full vertical joints.

1. Clean soiled surfaces with fiber brush and soap powder and rinse thoroughly with clear water.
2. Allow cleaned surfaces to dry before setting.
3. Wet joint surfaces thoroughly before applying mortar.
4. Rake out mortar joints for pointing with sealant.

D. Tool exposed joints slightly concave when thumbprint hard, using a jointer larger than joint thickness unless otherwise indicated.

1. For glazed masonry units, use a nonmetallic jointer **3/4 inch** or more in width.

3.6 INSTALLATION OF EXPANSION JOINTS

A. General: Install expansion-joint materials in masonry veneer as masonry progresses. Do not allow materials to span expansion joints without provision to allow for in-plane wall or partition movement.

B. Form expansion joints as follows:

1. Build flanges of metal expansion strips into masonry. Lap each joint **4 inches** in direction of water flow. Seal joints below grade and at junctures with horizontal expansion joints if any.
2. Build flanges of factory-fabricated, expansion-joint units into masonry.
3. Build in compressible joint fillers where indicated.
4. Form open joint full depth of brick wythe and of width indicated, but not less than [**3/8 inch**][**1/2 inch**]<**Insert minimum width**> for installation of sealant and backer rod specified in Section 079200 "Joint Sealants."

C. Provide horizontal, pressure-relieving joints by either leaving an airspace or inserting a compressible filler of width required for installing sealant and backer rod specified in Section 079200 "Joint Sealants," but not less than [**3/8 inch**]<**Insert minimum width**>.

1. Locate horizontal, pressure-relieving joints beneath shelf angles supporting masonry.

3.7 INSTALLATION OF WEEP/CAVITY VENTS

A. Install weep holes in veneers in head joints of first course of masonry immediately above embedded flashing.

1. Use [**specified weep/cavity vents**][**or**][**open-head joints**] to form weep holes.
2. Use wicking material to form weep holes above flashing under brick sills. Turn

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wicking down at lip of sill to be as inconspicuous as possible.

3. Space weep holes **24 inches** o.c. unless otherwise indicated.
4. Space weep holes formed from [**plastic tubing**][**or**][**wicking material**] **16 inches** o.c.
5. Cover cavity side of weep holes with plastic insect screening at cavities insulated with loose-fill insulation.
6. Trim wicking material flush with outside face of wall after mortar has set.

B. Place cavity drainage material in airspace behind veneers to comply with configuration requirements for cavity drainage material in "Accessories" Article.

C. Install vents in head joints in exterior wythes at spacing indicated. Use [**specified weep/cavity vent products**][**or**][**open-head joints**] to form vents.

1. Close cavities off vertically and horizontally with blocking in manner indicated. Install through-wall flashing and weep holes above horizontal blocking.

3.8 FIELD QUALITY CONTROL

A. Testing Agency: [**Owner will engage**][**Engage**] a qualified testing agency to perform tests and inspections. 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 will be at Contractor's expense.

B. Inspections: Special inspections in accordance with Level 2 in TMS 402/602.

1. Begin masonry construction only after inspectors have verified proportions of site-prepared mortar.

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

D. Clay Masonry Units: Test each type of unit provided, in accordance with ASTM C67/C67M for compressive strength.

E. Concrete Masonry Units: Test each type of unit provided, in accordance with ASTM C140/C140M for compressive strength.

F. Mortar Aggregates: Ratio test (proportion specification) for each mix provided, in accordance with ASTM C780.

G. Mortar: Test each mix provided, in accordance with ASTM C780. Test mortar for [**mortar air content**][**and**][**compressive strength**].

3.9 REPAIRING AND POINTING

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

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B. Pointing: During the tooling of joints, enlarge voids and holes, except weep holes, and completely fill with mortar. Point up joints, including corners, openings, and adjacent construction, to provide a neat, uniform appearance. Prepare joints for sealant application, where indicated.

3.10 CLEANING

A. In-Progress Cleaning: Clean masonry veneer 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. Remove large mortar particles by hand with wooden paddles and nonmetallic scrape hoes or chisels.
2. Test cleaning methods on sample wall panel; leave one-half of panel uncleaned for comparison purposes. Obtain Architect's approval of sample cleaning before proceeding with cleaning of masonry.
3. Protect adjacent stone and nonmasonry surfaces from contact with cleaner by covering them with liquid strippable masking agent or polyethylene film and waterproof masking tape.
4. Wet wall surfaces with water before applying cleaners; remove cleaners promptly by rinsing surfaces thoroughly with clear water.
5. Clean brick by bucket-and-brush hand-cleaning method described in BIA Technical Notes 20.
6. Clean masonry with a proprietary acidic cleaner applied in accordance with manufacturer's written instructions.

3.11 MASONRY WASTE DISPOSAL

A. Salvageable Materials: Unless otherwise indicated, excess masonry materials are Contractor's property. At completion of masonry veneer work, remove from Project site.

B. 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. Crush masonry waste to less than **4 inches** in each dimension.
2. Mix masonry waste with at least two parts of specified fill material for each part of masonry waste. Fill material is specified in Section 312000 "Earth Moving."
3. Do not dispose of masonry waste as fill within **18 inches** of finished grade.

C. Masonry Waste Recycling: Return broken masonry units not used as fill to manufacturer for recycling.

D. 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.

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END OF SECTION 042613

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SECTION 05 12 00 – STRUCTURAL STEEL

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 01 Specifications, apply to this section.

1.2 DESCRIPTION

A. Work included: All labor and materials required to furnish and install structural steel work shown on the Drawings and required by these Specifications, including that shown on Mechanical or Electrical Drawings, or required in their Specification sections.

B. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other sections and all Drawings for related work.

C. Work furnished but not installed under other Sections: Anchor rods, loose bearing and base plates, loose lintels, and connection hardware to be cast into concrete, masonry, or precast concrete.

D. Work affected by others: Mechanical equipment support framing, equipment loads, framing around openings, and structure in any way related to mechanical requirements is shown for bidding purposes only. Responsibility for coordinating the work of this Section with these requirements is solely that of the Contractor. Contractor’s review of shop drawings will be taken to indicate that this coordination has been completed.

1.3 QUALITY ASSURANCE

A. Reference Standards:
   1. By the American Institute of Steel Construction (AISC):
      a. Specification for the Design, Fabrication and Erection of Structural Steel for Buildings.
      b. Specification for Structural Joints Using High-Strength Bolts.
      c. Code of Standard Practice for Steel Buildings and Bridges.
      d. Seismic Provisions for Structural Steel Buildings.
   2. By the American Welding Society (ANSI/AWS):
      a. Structural Welding Code-Steel (AWS D1.1)
      b. Symbols for Welding, Brazing, and Non-Destructive Testing (A2.4).

B. Fabricator’s qualifications:

1. Minimum five years' continuous experience in the fabrication of steel for projects of similar quality and scope.
2. Certified in the American Institute of Steel Construction's (AISC) Quality Certification program.
3. If Fabricator is not certified with AISC, in accordance with chapter M and N of the AISC manual, the following minimum shop inspections for structural steel fabrication are required:
   a. Shop welding, high-strength bolting, and details.
   b. Shop cut and finished surfaces.
   c. Shop heating for straightening, cambering, and curving.
   d. Tolerances for shop fabrication.
4. These inspections and certifications are to be paid for at the Contractor's expense and are treated as an additional item in fulfilment of project Special Inspections set forth by the Jurisdiction's requirements. Inspection Agency must be qualified to perform shop inspection with knowledge and experience of steel construction. Submit Inspector qualifications for approval by Architect.

C. Erector's qualifications: Minimum five years' continuous experience in similar steel erection.

D. Welders' qualifications: Personnel and procedures are to be qualified per the requirements of the American Welding Society, as given in ANSI/AWS D1.1.

1.4 PERFORMANCE REQUIREMENTS

A. Connections: Select or design connections per AISC standards for forces and moments provided on the Drawings.
1. AISC Code of Standard Practice Connection Design Option 2 (connection selected by an experienced steel detailer utilizing standard AISC connection tables) shall be used where only shear reactions are provided and the geometry complies with the limitations of the tables in the AISC Manual of Steel Construction.
2. AISC Code of Standard Practice Connection Design Option 3 (connection designed by a licensed Engineer working for the Fabricator) shall be used where axial forces and/or moments are provided or when the member geometry does not comply with the limitations of the tables in the AISC Manual of Steel Construction.
3. Reactions provided are service level forces (ASD). Minimum shear reaction to be 15 kips. Shear reactions below 15 kips are not necessarily listed on the Drawings.
4. Minimum bolt diameter and grade is 3/4 inch diameter A325. Connection shall extend a minimum of one half the beam's 'T' dimension.

1.5 SUBMITTALS

A. Certification of experience: Submit, on request only, written description of personnel, projects, and equipment which document the experience and qualifications required of the Fabricator, Erector, and Welder.

B. Shop Drawings: Provide dimensioned erection plans with appropriate sections and details including member piece details that include the following:
   1. Include all shop and erection details, including cuts, copes, cambers, connections, holes, threaded fastener types, sizes and lengths, washers, and weld types, sizes, and lengths.
   2. Include embedment layout drawings.
   3. Indicate shop and field welds with symbols per ANSI/AWS A2.4
   4. Submit calculations of connections, and details of connections prepared by a licensed Professional Engineer, registered in the same state as the project site, for connections indicated to be designed with Option 3 from the AISC Code of Standard Practice.

C. Certification: Submit, on request only, the following:
   1. Certified copies of mill test reports with properly identified material.
   2. Certificates of Compliance for:
      a. Structural steel shapes.
      b. Shear studs.
      c. High-Strength threaded fasteners.
      d. Direct-tension indicators.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery:
   1. Members to be hot-dip galvanized shall retain compliance with ASTM A6 after the galvanizing process. Non-compliance will be cause for rejection.
   2. Deliver anchor rods and other items to be embedded in cast-in-place concrete or masonry prior to the start of that work. Provide setting drawings, templates, or instructions required for the installation of such items.

B. Storage:
   1. Store steel at the site above ground on platforms, skids, or other supports.
   2. Protect steel from corrosion.
   3. Store packaged materials in their original unbroken packages.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Structural steel wide flange, W shapes:
   1. Fy = 50 ksi, ASTM A992.

B. Structural steel M, S, HP shapes, Channels, Angles, plates, bars, etc.:
   1. Fy = 36 ksi, ASTM A36.
   2. Fy = 50 ksi, ASTM A572.

C. Structural steel tubing:
   1. Round steel pipe: Fy = 35 ksi, ASTM A53, Type E or S, Grade B.
   2. Square and Rectangular HSS: Fy = 50 ksi, ASTM A500, Grade C.
   3. Round HSS: Fy = 46 ksi, ASTM A500 Grade C.

D. Anchor Rods: Provide heavy washers for anchor rods.
   1. Threaded and nutted: ASTM F1554, Grade 36
   2. Hooked anchors: ASTM A307.

E. High-Strength Bolts: ASTM A325 of A490.

F. Tension Controlled Connections:
   1. Direct-Tension Indicators, compressible-washer-type: ASTM F959, Type A325 of A490.
   2. High-Strength twist-off-type Tension Controlled bolts: ASTM F1852, Type 1 with round of heavy heax head.

G. Post-Installed Anchors:
   1. Install post-installed anchors in accordance with the Manufacturer's installation instructions.

H. Welding Electrodes: Conform to the requirements of ANSI/AWS D1.1, using Series E70 electrodes, appropriate for the materials being welded.

I. Shop Paint Primer:
   1. Primer to be compatible with finish paint.
   2. Interior exposure, normally dry conditions (SSPC Environmental Zone 1A) or Exterior exposure, normally dry conditions (SSPC Environmental Zone 1B): SSPC Paint 25.

J. Galvanizing Repair Paint: High zinc-dust-content paint for re-galvanizing field welds and repairs containing not less than 93 percent zing dust by weight: SSPC Paint 20.

2.2 FABRICATION

A. Conform to applicable provisions of the reference standards listed in Part 1 of this Section, as modified herein.
   1. Connection type is to be:
      a. Snug-tight unless noted otherwise.
      b. Slip-Critical where specifically shown on the Construction Drawings. Provide twist-toff tension controlled bolts or direct-tension indicating washers at all locations.

2. Bolted connections shall be made with High-Strength bolts (A325 or A490). Standard bolts and nuts are permitted only where specified on the Drawings.

B. Camber: Provide camber in beams as indicated on the drawings.

C. Finishing: Ends of members in direct contact bearing, such as columns at their bases and splices, are to be “finished”, as defined in the Code of Standard Practice.

D. Bearing and base plates: Column base plates are to be shop attached. Beam bearing plates may be attached or loose.

E. Holes: Drill or punch holes in members as required for passage of conduit and piping, and attachment of joists, nailers, etc. burning such holes is not permitted without prior approval of the Architect. If opening is not shown on structural Drawings, obtain prior approval.

F. Low-friction bearing pads: Attach to steel per Manufacturer’s requirements.

G. Cleaning:
1. Remove oil, dirt, loose mill scale, or other material that would impair welding performance of friction-type connections or adherence of concrete or sprayed-on fireproofing.
2. For steel that is to be painted, cleaning techniques are to be as required by the appropriate SSPC paint specification.

H. Shop Priming: Shop prime steel surfaces except the following:
1. Surfaces embedded in concrete or mortar.
2. Surfaces to be field welded.
3. Surfaces of high-strength bolted, slip-critical connections.
4. Surfaces to receive sprayed fire-resistive materials (applied fireproofing).
5. Galvanized surfaces.
6. Surfaces enclosed in interior; dry construction not exposed to view in finished structure.

I. Painting:
1. Steel not exposed to view in the finished structure need not be painted.
2. Steel exposed to view, except that to be galvanized is to be painted as follows:
   a. Other interior exposure: Apply one-coat shop paint system in accordance with SSPC-PS 7.01. Apply two coats to surfaces inaccessible after assembly.

J. Galvanizing: Where required, galvanizing is to conform to ASTM A123 and A153. Except for bolts, nuts, and anchors, all galvanizing is to be done after fabrication.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Prior to beginning work of this Section, verify that the installed work of other trades is complete and correct to the extent necessary for the proper execution of the work of this Section. This includes locations of anchor rods, bearing plates, bearing areas, and finished elevations of concrete and concrete masonry.

B. In the event of discrepancies, immediately notify the Architect. Do not proceed with work affected by the discrepancies until they have been resolved.

3.2 ERECTION

A. Conform to the applicable provisions of the reference standards listed in Part 1 of this Section, as modified herein.

B. The structure is designed to be self-supporting and stable after the building is fully completed. It is solely the Contractor's responsibility to determine erection procedure and sequence; and to ensure the stability of the building and its components and parts, and of the adequacy of temporary or incomplete connections during erection. This includes the addition of whatever temporary bracing, guys, or tie-downs that might be necessary. Such material is not shown on the Drawings. If applied, they shall be removed as conditions permit, and shall remain the Contractor's property.

C. Safety: It is the Contractor's responsibility to follow all applicable safety codes and regulations governing this work.

D. Clean bearing surfaces and other surfaces in permanent contact with each other prior to assembly.

E. Splices are permitted only where indicated.

F. Tolerances: Per AISC Code of Standard Practice.

G. Field corrections of fabrication errors by gas cutting is not permitted in major members without prior approval of the Architect.

H. Welds that are subject to foot traffic or are exposed to view in the finished structure are to be ground smooth and flush with adjacent surfaces.

I. Touch-up painting: After erection, touch-up field connections and abrasions in the shop coat with same paint used for shop coat. Do not paint welds until they have been cleaned in accordance with AWS D1.1.

3.3 FIELD QUALITY CONTROL

A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special

Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the Jurisdiction.

END OF SECTION

SECTION 05 21 00 – STEEL JOISTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to this section.

1.2 DESCRIPTION

A. Work included: All labor and materials required to furnish and install steel joist work shown on the Drawings and required by these Specifications. Include all bridging, ceiling extensions, anchors, extended ends, bearing plates, and other accessories required for a complete installation.

B. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other sections and all Drawings for related work.

1.3 QUALITY ASSURANCE

A. Reference Standards, by the Steel Joist Institute (SJI) and the American Institute of Steel Construction (AISC):
   1. Standard Specifications for Open Web Steel Joists (K-series).
   2. Standard Specifications for Longspan Steel Joist (LH-series) and Deep Longspan Steel Joists (DLH-Series).

B. Manufacturer’s qualifications: A manufacturer certified by Steel Joist Institute (SJI) to manufacture joists complying with applicable standard specifications and load tables of SJI “Specifications”.

C. Welders’ qualifications: Personnel and procedures are to be qualified per the requirements of the American Welding Society, as given in ANSI/AWS D1.1.

D. Tolerances:
   1. Sweep: Maximum 1/480 of joist length.
   2. Spacing: Maximum 1” variation, throughout full joist length.
   3. Plumbness: 1/4 inch per foot of joist depth.

1.4 SUBMITTALS

A. Shop Drawings:
   1. Provide a dimensioned layout or erection drawing that indicates mark, number, type, and location of all joists.

2. Indicated all bridging, including size, attachment to the joists, and anchorage of bridging at the ends of each line.
3. Indicate connection details including locations and details of bearing plates.
4. Indicate paint type, and all accessories required for the proper and complete installation of joists. Include handling and erection instructions.
5. For K-series special joists, provide load diagrams stating all distributed and concentrated loads applied to the joist. These loads shall correspond to the loads shown on the structural contract drawing.
6. Shop Drawings are to be sealed by a Professional Engineer registered in the same state as the project site.

B. Certification: Submit, on request only, the following:
1. Certified copies of mill test reports.
2. Inspection reports for field connections, including splices.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver, store, and handle joists as recommended in SJI's "Specifications".

B. Deliver anchor rods, bearing plates, and other items to be embedded in cast-in-place concrete or masonry prior to the start of that work. Provide setting drawings, templates, or instructions for the installation of such items.

C. Provide tags on joists for ready identification.

D. Store joists off ground, in upright position. Protect from corrosion and keep free of dirt and other detrimental substances.

E. Store and handle joists to avoid damage. Repair or replace damaged joists.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Joist: Comply with the requirements of SJI "Specifications".

B. Bearing Plates, Bridging, and Accessories: ASTM A36, Fy = 36 ksi.

C. Anchor Rods: ASTM A307.

D. Paint: SSPC-Paint 15, or manufacturer's standard red oxide or gray complying with performance requirements of SSPC-Paint 15, except that black asphalt is not permitted. Do not paint steel to receive fire-proofing.

E. Welding electrodes: Conforms to requirements of ANSI/AWS D1.1 using Series E70 electrodes, appropriate for the material being welded.

2.2 DESIGN CRITERIA

A. Round bar chords are not permitted.

B. Extended ends are to be designed for loads on Drawings. If none are given, design for the same load (lbs./lin. ft.) as the joist.

C. Provide ceiling extensions in areas scheduled to receive contract or suspended ceilings.

D. Bridging:
1. For K-Series joists, use horizontal bridging, except where diagonal bridging is specifically shown on Drawings. Connections to joists and to each other at points of intersection to be welded.
2. For LH-Series and DLH-Series joists, use diagonal bridging. Connections to joists and each other to be bolted.
3. Bridging shown on the drawings is schematically indicated. Detail, fabricate, and install bridging in accordance with SJI requirements. Provide additional bridging as required for stability.
4. Design roof joists and bridging for a net uplift (ASD) of 10 psf, unless higher loading is indicated on plans. Provide additional bridging as required.
5. Longspan, LH-Series, and Deep Longspan, DLH-Series, joist supporting cementitious roof decking without bulb tees are to be designed as unbraced. Design and provide bridging to laterally brace the top chord of the joists as required.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Prior to beginning work of this Section, verify that the installed work of other trades is complete and correct to the extent necessary for the proper execution of the work of this Section.

B. In the event of discrepancies, immediately notify the Architect. Do not proceed with work affected by the discrepancies until they have been resolved.

3.2 ERECTION

A. General: Install joists and accessories plumb, square and true to line and in conformance with the requirements of SJI “Specifications”.

B. Install temporary and permanent bridging with joist erection before joist support construction loads. Comply with Erection Stability and Erection requirements of SJI “Specifications”.

C. Concentrated loads: Provide reinforcing for chords or webs as required at points of concentrated loads.

D. Touch-up painting: after installation, touch-up unpainted areas, connections, and abrasions in the shop coat with the same paint used for the shop coat.

3.3 FIELD QUALITY CONTROL

A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the Jurisdiction.

END OF SECTION

SECTION 05 31 00 – METAL DECKING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specifications, apply to this section.

1.2 DESCRIPTION

A. Work included: All labor and materials required to furnish and install metal decking and accessories including closures, hanger tabs, edge filler plates, ridge and valley plates, end enclosure angles, and roof sump pans were shown on the Drawings and or required for a complete installation.

B. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other sections and all Drawings for related work.

1.3 QUALITY ASSURANCE

A. Reference Standards:
   1. Specification for the Design of Cold-Formed steel Structural Members, current edition, by the American Iron and Steel Institute.
   2. Design Manual for Floor Decks and Roof Decks, by the Steel Deck Institute (SDI)

B. Manufacturer’s qualifications: Regularly engaged in the manufacture of similar decking.

C. Erector’s qualifications: Minimum five years’ experience in installation of similar decking.

D. Welder’s qualifications: Personnel and procedures are to be qualified per the requirements of the American Welding Society as given in AWS D1.1.

1.4 SUBMITTALS

A. Certification of experience: Submit, on request only, written description of personnel, projects, and equipment which document the experience and qualifications required of the manufacturer, erector, and welders.

B. Shop Drawings:

1. Provide a deck placement plan that indicates mark, number, type, finish, dimensions, and location of deck units. Include details and locations of sump pans, openings, and all accessories.
2. Indicated method of attachment to supporting members.
3. Indicate details and installation instructions for all types of decking and all accessories.
4. Indicate sequence of installation, where critical.

C. Manufacturer's Certification:
1. Certify compliance with structural criteria. Published load tables and literature are usually acceptable. Provide design calculations on request only.
2. Certify compliance with finish criteria with test reports as required.
3. Furnish evidence of listing in Underwriter's Laboratory for the specified U.L. Design Assembly.

D. Sustainability Submittal Requirements: Refer to Section 01 81 13 for submittal requirements.
1. Submit product data and documentation that indicates materials having a post-consumer and pre-consumer recycled content that conforms to the requirements to obtain LEED credits.
a. All metal decking shall have a minimum 70% post-consumer recycled content.
2. Submit product data and documentation that identifies material cost for each type of material provided and includes location of extraction and manufacture of materials that conforms to the requirements to obtain LEED credits.
a. All steel products shall be extracted, processed, and manufactured/fabricated within a radius of 500 miles from the project site.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Prevent damage to deck or finish during delivery, handling, and storage. Store on blocking or platforms, off the ground, with one end elevated for drainage.

B. Protect from rusting with waterproof covering, or storage under roof. Follow manufacturer's instructions for storage and protection of deck surfaces that are not painted or galvanized.

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

A. Roof deck [without lightweight fill]:
1. Type: 1-1/2 inches deep, 18 ga. Minimum, wide rib (per SDI).
2. Finish: Galvanized or painted.

3. Other: Structural requirements as given on Drawings.

B. Metal Form Deck (Conform/Centering):
1. Type: 1 inches deep, 22 ga. Minimum, wide rib, corrugated.
2. Finish: Galvanized.

2.2 MATERIALS AND FINISHES:

A. Materials: Steel sheet conforming to ASTM A653 or A611 with minimum yield strength of 33 ksi.

B. Finishes:
1. Galvanized: Conform to ASTM A653, G60.
2. Phosphatized/Painted: After sheet is phosphatized, apply flexible primer paint, baked on the underside. Minimum dry film thickness to be 0.5 mil. Painted: Clean units of scale and rust, phosphatize or bonderize, then apply a coat of enamel, vinyl, or epoxy paint. Paint to meet the following criteria:
a. Exposure to salt spray per ASTM B117 for 72 hours. After exposure, there is to be no evidence of rusting, the degree of blistering is to be not worse than No. 8F per ASTM D714, and undercutting at the scribe to be not worse than No. 10 per ASTM D1654.
b. Water immersion per ASTM D870 for 250 hours. After immersion, degree of blistering is to be not worse than No. 8 per ASTM D714.

C. Accessories: Same material and finish as deck units, except that interior closures may be of compressible material.

D. Sound insulation: Glass fiber type. Required in areas with acoustical roof deck.

E. Field touch-up paint:
1. For painted deck: use air-drying paint similar to shop coat.
2. For galvanized deck: use zinc chromate paint.

2.3 FABRICATION

A. Units are to be continuous over at least three spans, where possible. Where units are single or double-span, use heavier gauge if required for stress or deflection control. End laps are to occur over supports.

B. Units are to have nested side laps, except for metal centering units.

C. Decking shall be finished such that field paint or sprayed fireproofing can be applied without further preparation.

PART 3 - EXECUTION

3.1 SURFACE CONDITIONS

A. Prior to beginning work of this Section, verify that the installed work of other trades is complete and correct to the extent necessary for the proper execution of the work of this Section.

B. In the event of discrepancies, immediately notify the Architect. Do not proceed with work affected by the discrepancies until they have been resolved.

3.2 ERECTION

A. Install decking in accordance with approved Placement Drawings.

B. Tolerance: Align adjacent units with 1/4 inch in 40 feet.

C. Attach metal deck to supports as indicated in the Structural Drawings and should resist the following:

1. Welding: Attach supports by welding from topside only. Any welds that burn hole in decking or supporting member will be rejected. Minimum size and spacing of welds to be as recommended by the manufacturer or as shown on the Drawings. Additional requirements are as follows:
   a. Roof Deck: Attach to resist the required gross uplift force, but not less than 45 pounds per square foot in eave overhang areas; and not less than 30 pounds per square foot in all other areas. Minimum attachment is to be 5/8-inch diameter fusion welds spaced at 6-inches at end laps and at 12-inches at intermediate supports, including side laps.
   b. Metal Form Deck: Use manufacturer’s standard welding washers. Minimum attachment is to be 5/8-inch diameter fusion welds spaced at 15-inches at end laps and at 30-inches at intermediate supports.
2. Direct Fastening: Attach to supports by direct fastening from topside only. If direct fastening is preferred as an alternate by the Contractor, submit signed and sealed shop drawings indicating fastener size and spacings that meet or exceed the welded connection capacity of the deck as indicated in the structural drawings.

D. Sidelap Fastening: Method as recommended by manufacturer. Spacing not to exceed 3-feet.

E. Closures: Install in deck flutes over supports or other construction at building perimeter and a perimeter of interior rooms. Set in a true even line, flush with construction below, eliminating any shelf or pocket. Closure are to be accurately shaped and installed, to provide a tight fit.

F. Openings: Field cut small openings, bevels, miters, etc. as required. Provide additional support for openings exceeding 9-inches in width.

G. Hanging Loads: Do not hang items other than suspended ceilings from the underside of metal decks, unless specifically approved by the Architect.

H. Construction Loads:
1. Do not use deck as storage or working platform until it has been permanently attached to supports. Assure that construction loads do not exceed the carrying capacity of the deck.
2. Deck as formwork: In metal deck applications which receive concrete fill, the deck is designed to support the self-weight of deck, concrete and a uniform construction live load of 20 psf, which is considered adequate for typical construction applications that consist of concrete transport and placement by hose and concrete finishing hand tools. Bulk dumping of concrete using buckets, chutes, hand carts, or the use of heavier motorized finishing equipment such as power screeds may require redesign of the deck. Notify the Engineer-of-Record once means-and-methods of concrete placement are established to determine what deck or framing modifications are required.

I. Repair and Touch-up:
1. At areas where deck will be exposed to view, remove and replace any units with damage or defect that cannot be concealed by painting.
2. Where deck will not be exposed to view, repair any cuts and holes with plate of same gauge as deck.
3. Touch-up all damaged areas of finish, on both top and bottom sides of deck.

3.3 FIELD QUALITY CONTROL

A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the Jurisdiction.

END OF SECTION

SECTION 05 40 00 – COLD-FORMED METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provision of the Contract, including General and Supplementary Conditions and Division 1 Specifications, apply to this section.

1.2 DESCRIPTION

A. Work included: All labor and materials required to design, furnish, and install cold-formed metal framing as shown on the Drawings and or required by these specifications. Cold-formed metal framing includes:
   1. Interior and Exterior load-bearing wall studs and framing.
   2. Exterior non-load-bearing curtain-wall and soffit framing.
   3. Floor and ceiling joists and roof rafter framing.
   4. Shear walls.
   5. Related accessories and necessary fasteners to complete the system.

B. Related work specified elsewhere: The general provisions of the Contract apply to the work of this Section, as though reproduced herein. Carefully examine all other sections and all Drawings for related work.

C. Provide openings and special framing required by other trades. Equipment framing, loads, openings, and structure are shown for bidding purposes only. Obtain approval of other trades before proceeding with such work. Coordinate work with mechanical and electrical requirements.

D. Field measurement of the existing construction shall be conducted when required to ensure the proper coordination and fit of new work.

1.3 QUALITY ASSURANCE

A. Standards: Comply with American Iron and Steel Institute (AISI) “Specifications for the Design of Cold-Formed Structural Steel Members”, except as otherwise indicated.
   1. The minimum uncoated thickness of the cold-formed metal framing delivered to the project shall not be less than 95% of the design thickness indicated. Lesser thicknesses shall be permitted at the bends due to cold forming.

B. Welding of CFMF: Comply with American Welding Society, AWS D1.1 “Structural Welding Code – Steel” and AWS D1.3 “Structural Welding Code – Sheet Steel”. Qualify welding processes and welding operators in accordance with AWS “Standard Qualification Procedure”.

C. Fire-rated assemblies: Where work is indicated to comply with fire-resistance ratings, provide materials and installations identical to applicable tested and listed components and assemblies.

D. Provide each type of cold-formed metal framing required produced by one manufacturer.

E. Reference Standards:
1. American Society for Testing and Materials (ASTM):
   a. ASTM A653 “Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc Iron Alloy Coated (Galvannealed) by the Hot-Dip Process”.
   b. ASTM A780 “Standard Practice for Repair of Damaged and Uncoated Areas of Hot Dip Galvanized Coatings”.
   c. ASTM A924 “Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process”.
   d. ASTM A1003 “Standard Specification for Steel Sheet, Carbon, Metallic- and Nonmetallic-Coated for Cold-Formed Framing Members”.
   e. ASTM C955 “Standard Specification for Load bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Board and Metal Plaster Bases”.
   f. ASTM C1007 “Standard Specification for Installation of Load Bearing (Transverse and Axial) Steel Studs and Related Accessories”.
2. American Welding Society (AWS):
   a. AWS A2.4 “Symbols for Welding and Nondestructive Testing”.
   b. AWS D1.1 “Structural Welding Code-Steel”.
   c. AWS D1.3 “Structural Welding Code – Sheet Steel”.
3. Association of Wall and Ceiling Industries-International (AWCI) and Metal Lath/Steel Framing Association (ML/SFA)
   a. AWCI-ML/SFA “Steel Framing Systems Manual”.

1.4 PERFORMANCE REQUIREMENTS

A. Provide cold-formed metal framing capable of withstanding design loads and within deflection limits indicated.

B. Design Loads: Occupancy Live, Roof Live, Snow, Wind, and Seismic loads shall be as indicated in the General Structural Notes on the Structural Drawings.

C. Deflection Limits: Design framing systems to withstand the total design loads without the deflection exceeding the following:
1. Exterior wall framing horizontal deflection where “L” is the stud height:
   a. Supporting flexible finishes (including EIFS): L/240
   b. Supporting Portland Cement-based Plaster (Stucco): L/360
   c. Supporting masonry, brick, or stone finishes: the more stringent of L/600 or 3/8”.

d. Supporting extremely brittle finishes: L/720 or as defined by finish manufacturer.

2. Interior wall framing horizontal deflection where “L” is the stud height and the applied horizontal live load is 5 psf (ASD) loading:
   a. Supporting flexible finishes: L/240.
   b. Supporting brittle finishes: L/360.
3. Ceiling joist framing vertical deflection where “L” is the horizontal span of the joist:
   a. Total Loads: L/240 or L/360.

D. Design non-load bearing curtain wall framing and connections to accommodate 3/4-inches vertical deflection of the building framing due to live load deflections and construction tolerances.

1.5 SUBMITTALS

A. Submit Manufacturer’s product data and installation instructions for each type of cold-formed metal framing and accessory required.

B. Delegated design:
1. Stud size and details shown on the Drawings indicate general installation and connection methods. Complete detail of components for all loads and forces is to be shown on the Shop Drawings. No changes from sizes and installation methods shown on the Construction Drawings will be permitted without verification that the design criteria cannot be met and without express written consent of the Architect and the Engineer of Record.
2. Professional Engineer Qualifications: A Professional Engineer who is legally qualified to practice in the jurisdiction where the project is located and who is experienced in providing engineering services for installations of cold-formed metal framing that are similar to those indicated for this project in material, design, and extent.
3. Shop drawings must include structural analysis data of all cold-formed metal framing and connections in conformance with design loads stated on the Structural Drawings. Shop drawings and analysis must bear the seal of the qualified Engineer responsible for their preparation.

C. Shop Drawings: submit drawings for approval that include the following minimum information:
1. Fully dimensioned plans and elevations with cross sections and details depicting all component member locations, orientations, and layout.
2. Wall, Floor, and/or Roof member sizes and gauge designations, number, type and spacing.
3. Supplemental strapping, bracing, bridging accessories, and details required for proper installation.
4. Details of connections that indicate screw types, quantities, locations, weld size and locations, and any other fastener requirements.

D. Supplier’s Certification:

1. The supplier of the cold-formed metal framing shall submit written evidence of having a minimum of five years' experience on projects of similar type and scope, including a description of physical facilities, quality control, methods, personnel experience, and erection capacities.
2. Cold-formed pre-engineered steel truss manufacturer must adhere to Special Inspection requirements for fabricated items.

E. Welding of cold-formed metal components shall only be performed by operators qualified per AWS D1.1 and D1.3 for the thickness of materials being used. Submit copies of welder certificates upon request only.

F. Upon request only, submit mill certificates from the steel producer.

1.6 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Deliver materials in manufacturers unopened containers or bundles fully identified by name, brand, type, and grade. Exercise care to avoid damage during unloading, storing, and erection.

B. Protect cold-formed metal framing members and accessories from corrosion, deformation, damage, and deterioration when stored at the job site as required in AISI's Code of Standard Practice. Store cold-formed metal framing off the ground on pallets, platforms or other supports, and provide a waterproof covering. Keep cold-formed metal framing free of dirt and other foreign material.

1.7 PROJECT CONDITIONS

A. Coordinate metal frame positioning with trades furnishing items for attachment of built-in members.

B. Promptly furnish anchors, bolts, inserts, clips, and other items required under this section but built in with work of other trades.

PART 2 - PRODUCTS

2.1 ACCEPTABLE MANUFACTURERS

A. Cold-formed metal framing products by the following manufacturers are approved for use on this project: ClarkDietrich Metal Framing; Marino Ware, a division of Ware Industries; United Metal Products, Inc.; Scafco Corp.; and The Steel Network, Inc.

B. Connection component and fastener products by the following manufacturers are approved for use on the project: ClarkDietrich Metal Framing: Marino Ware, a division of Ware Industries; and The Steel Network Inc.

C. Alternate manufacturers of cold-formed metal framing, connection components, and fasteners are to be submitted for review and approval two weeks before submitting bids.

2.2 MATERIALS AND FINISHES:

A. Steel sheet: ASTM 1003, Structural Grade, Type H, metallic coated, of thickness and grade as follows:
1. 33 mils – 0.0346 inches (20 gauge), Fy = 33 ksi.
2. 43 mils – 0.0451 inches (18 gauge), Fy = 33 ksi.
3. 54 mils – 0.0566 inches (16 gauge), Fy = 50 ksi.
4. 68 mils – 0.0713 inches (14 gauge), Fy = 50 ksi.
5. 97 mils – 0.1017 inches (12 gauge), Fy = 50 ksi.
6. Track and bridging components shall have a minimum Fy = 33 ksi.
7. Connection clip angles and vertical or horizontal deflection connections shall have a minimum Fy = 33 ksi.

B. Framing Components: Manufacturer's standard C-shaped cold-formed metal framing having punched and/or un-punched webs with stiffened flanges shall comply with ASTM C955. Provide sizes, shapes, and gauges indicated. Nomenclature used on the Drawings is designated by: Depth, Shape, Width, and Thickness of framing components. i.e. "600 S162-54".
1. Depth: The number represents the depth of the member multiplied by 100 and expressed as a whole number in inches. i.e. '362' = 3-5/8"; 600' = 6"; '800' = 8".'
2. Shape: 'S' = C-shaped member; 'T' = Track member; 'F' = Furring channel; 'U' = U-shaped member.
3. Width: The number represents the flange width of the member multiplied by 100 and expressed as a whole number in inches. i.e. '162' = 1-5/8"; '200' = 2"; 250 = 2-1/2".
4. Thickness: Expressed in mils as defined above.

C. System Accessories: Provide manufacture's standard steel tracks, bridging, blocking, clip angles, reinforcements, stiffeners, fasteners, braces, and accessories for each type of cold-formed metal framing required. Provide all components recommended by the manufacturer for the applications indicated and as needed to provide a complete metal framing system.

D. Finish:
1. Galvanized: Provide framing components: studs, joists, rafters, and headers with protective zinc coating complying with ASTM A1003, minimum G60 coating.
2. Provide connection components; clip angles, deflection angles, joist hangers, hurricane ties, holdowns, etc. with protective zinc coating complying with ASTM A1003, minimum G90 coating.
3. Galvanized repair paint: Tnemec Co., Inc. – No. 92 "Tneme-Zinc"; SSPC-Paint 20; or an approved equal zinc-rich primer paint.

E. Fasteners:

1. Manufacturer's recommended self-drilling, self-tapping screws, bolts, nuts, and washers with hot-dip galvanized finish complying with ASTM C1513.
2. Anchorage devices: Power-actuated Fasteners (PAF), anchor rods, drilled expansion anchors, or chemical anchors.
3. Welding: Comply with AWS D1.1 when applicable, and AWS D1.3 for welding base materials less than 1/8" thick.

F. Shims: Load-bearing, high-density multimonomer plastic, non-leaching.

2.3 FABRICATION

A. Cut framing to fit squarely against abutting members. Hold members securely in position until properly fastened.

B. Saw cut all field cuts of cold-formed metal framing members and components squarely for attachment to perpendicular members, or as required for an angular fit against abutting members.

C. Attach and join indicated components by welding. Attach and join other components by welding, bolting, or screw fasteners as recommended by the manufacturer. Wire-tying of framing members is not permitted.

D. Shear wall assemblies:
1. Fabricate assemblies using jigs or templates.
2. Reinforce stiffened brace framing assemblies to withstand handling, delivery, and erection stresses.
3. Fabricate assemblies to a maximum tolerance of 1/8 inches in 10 feet from true to line or squareness.

PART 3 - EXECUTION

3.1 INSTALLATION – GENERAL

A. Install cold-formed metal framing in accordance with ASTM C1007 unless otherwise indicated.

B. Install load bearing shims or grout between underside of wall bottom track or rim track and top of foundation wall or slab at studs or joist locations to ensure a uniform bearing surface on supporting concrete or masonry construction.

C. Install cold-formed metal framing and accessories plumb, square, and true to line according to the manufacturer's written recommendations and requirements in this Section.

D. Connections of cold-formed metal framing members and components are to be securely anchored to the supporting structure according to the manufacturer's written recommendations and requirements of this Section.

E. Do not bridge building expansion joints and control joints with cold-formed metal framing members or accessories. Frame each side of joints with independent members.

F. Install insulation in assemblies and built-up members in exterior framing, such as headers, multiple stud columns and jambs, sills, and boxed beams or joists that are not accessible to the insulation contractor upon erection of framing work.

G. Fasten hole-reinforcing plates over web penetrations that exceed the manufacturer's standard punched openings.

3.2 INSTALLATION – INTERIOR AND EXTERIOR LOAD BEARING STUD WALLS

A. Install continuous top and bottom tracks sized to match studs. Align tracks securely to layout at base and top of studs. Secure tracks at corners, ends, and laps as recommended by the manufacturer for type of construction involved. Anchor tracks to building framing as recommended by the manufacturer except do not exceed 16 inches on center spacing for nail or power actuated fasteners, or 32 inches on center for anchor rods, expansion and chemical anchors, and other similar types of attachment.

B. Set studs plumb except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

C. Where stud systems abut structural columns or walls, including masonry walls, anchor ends of stiffeners to supporting structure.

D. Install supplementary framing, blocking and bracing in cold-formed metal framing systems wherever required to provide a complete and stable wall-framing system. Where type of supplementary support is not otherwise indicated, comply with stud manufacturer's recommendations and industry standards in each case, considering weight for loading resulting from item supported.

E. Squarely set studs against web of tracks and secure studs to top and bottom runner tracks by either welding or fastening with screws at both inside and outside flanges.

F. Install stud wall bridging (continuous cold-rolled channels positioned through the stud punch-outs) either by welding directly to the stud or attaching with clips. Bridging shall consist of the following:
   1. 3-5/8" and 6" studs: 1-1/2" x 16-ga. channel fastened to each stud with standard clip angles.
   2. Proprietary bridging bars provided and installed according to manufacturer's written instructions.

3. A combination of flat, taut, steel straps of width and thickness indicated and stud-track solid blocking of width and thickness to match stud. Fasten straps to stud flanges and secure solid blocking to stud webs or flanges with standard clip angles.
4. Install bridging rows at a maximum spacing of 4’-0” on center.

G. Frame wall openings larger than 2’-0” square with double stud at each jamb of frame, except where more than 2 studs are shown. Provide stud or joist header at all rough openings greater than 24 inches. Install tracks and jack studs above and below wall openings. Anchor tracks to jamb studs with stud shoes or by welding, and space jack studs same as full-height studs of wall. Secure stud system wall opening frame in manner indicated.

H. Provide extra studs, tracks, headers, etc. as required to frame the perimeter of openings.

I. Provide insulation, as indicated elsewhere, in all double jamb studs, double header members, and other assemblies that will not be accessible to the insulation contractor after erection.

J. Splicing of load-bearing studs and box headers is not permitted, unless specifically detailed otherwise.

K. Install steel sheet diagonal straps to both stud flanges, terminate at and fastened to reinforced top and bottom tracks. Fasten clip angle connectors to multiple studs at ends of bracing and anchor to structure.

3.3 INSTALLATION – NON-LOAD BEARING CURTAIN WALL STUDS

A. Install continuous top and bottom tracks sized to match studs. Align tracks accurately to layout at base and top of studs. Secure tracks at corners, ends, and laps as recommended by the manufacturer for type of construction involved. Securely anchor tracks to building framing as indicated.

B. Squarely set studs against web of tracks and secure studs to top and bottom runner tracks by either welding or fastening with screws at both inside and outside flanges.

C. Set studs plumb except as needed for diagonal bracing or required for non-plumb walls or warped surfaces and similar requirements.

D. Isolate non-load bearing curtain wall studs for the building structure to prevent transfer of vertical loads while providing lateral support.

E. Install stud wall bridging (continuous cold-rolled channels positioned through the stud punch-outs) either by welding directly to the stud or attaching with clips. Bridging shall consist of the following:
1. 3-5/8” and 6” studs: 1-1/2” x 16-ga. channel fastened to each stud with standard clip angles.

2. Proprietary bridging bars provided and installed according to manufacturer's written instructions.
3. A combination of flat, taut, steel straps of width and thickness indicated and stud-track solid blocking of width and thickness to match stud. Fasten straps to stud flanges and secure solid blocking to stud webs or flanges with standard clip angles.
4. Install bridging rows at a maximum spacing of 4'-0" on center.

F. Install supplementary framing, connections, diagonal braces or kickers, blocking, stiffeners, clip angles, and fasteners required to provide a complete and stable curtain wall framing system.

3.4 TOLERANCES

A. Fabricate and install members and assemblies to a maximum allowable variation as follows:
1. Variation from plumb, level, and true to line: 1/8 inch in 10 feet.
2. Variation of member spacing: not more than 1/8 inch plus or minus from spacing indicated. Cumulative error shall not exceed the minimum fastening requirements of the sheathing or other finishing materials.
3. Squareness: fabricate each cold-formed metal framing assembly to a maximum out-of-square tolerance of 1/8 inch.

3.5 FIELD REPAIRS AND PROTECTION

A. Galvanized repairs: Prepare and repair damaged galvanized coatings on fabricated and installed cold-formed metal framing, connections, and components with galvanized repair paint according to ASTMA780 and manufacturer's written instructions.

B. Provide final protection and maintain conditions in a manner acceptable to the manufacturer and installer, which ensure cold-framed metal framing is without damage or deterioration at time of Substantial Completion.

3.6 FIELD QUALITY CONTROL

A. Inspection and testing shall be in accordance with Special Inspections designated for this project as approved by the Building Official. Special Inspections must be documented with all corrective measures completed to satisfy compliance certificates as deemed necessary by the Jurisdiction.

END OF SECTION

SECTION 055116 - METAL FLOOR PLATE STAIRS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes industrial-type, straight-run stairs with steel floor plate treads and railings attached to metal floor plate stairs.

B. Related Requirements:

1. Section 018113 for sustainable design submittal requirements.
2. Section 055116 “Pipe and Tube Railings” for guard rails and railings associated with metal floor plate stairs.
3. Section 096600 “High Performance Coatings” for preparation of and coatings applied to metal plate stairs.

1.3 COORDINATION

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

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

1.4 ACTION SUBMITTALS

A. Product Data: For metal floor plate stairs and the following:

1. Metal floor plate treads.
2. Paint products.
3. Grout.

B. Sustainable Design Submittals:
1. Refer to Section 01 8113 for sustainable design submittal requirements.

C. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

D. Delegated-Design Submittal: For stairs, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.5 INFORMATIONAL SUBMITTALS

A. Welding certificates.

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

1.6 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

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

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section 014000 "Quality Requirements," to design stairs.

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

1. Uniform Load: 100 lbf/sq. ft. (4.79 kN/sq. m).
2. Concentrated Load: 300 lbf (1.33 kN) applied on an area of 4 sq. in. (2580 sq. mm).
3. Uniform and concentrated loads need not be assumed to act concurrently.
4. Stair Framing: Capable of withstanding stresses resulting from railing loads in addition to loads specified above.
5. Limit deflection of treads, platforms, and framing members to L/360.

C. Seismic Performance of Stairs: Metal stairs shall withstand the effects of earthquake motions determined according to ASCE/SEI 7.

1. Component Importance Factor: 1.5.

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. Refer to Section 01 8113 for sustainable design submittal requirements.

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

D. Rolled-Steel Floor Plate: ASTM A 786/A 786M, rolled from plate complying with ASTM A 36/A 36M or ASTM A 283/A 283M, Grade C or D.

E. Abrasive-Surface Floor Plate: Steel plate with abrasive granules rolled into surface or with abrasive material metallically bonded to steel.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following:

a. Balco, Inc.
b. GCP Applied Technologies Inc. (formerly Grace Construction Products).
c. IKG Industries, a division of Harsco Corporation.
d. SlipNOT Metal Safety Flooring; W.S. Molnar Company.

2.3 FASTENERS

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

B. Bolts and Nuts: Regular hexagon-head bolts, ASTM A 307, Grade A (ASTM F 568M, Property Class 4.6); with hex nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

C. Anchor Bolts: ASTM F 1554, Grade 36, of dimensions indicated; with nuts, ASTM A 563 (ASTM A 563M); and, where indicated, flat washers.

1. Provide mechanically deposited or hot-dip, zinc-coated anchor bolts for exterior stairs.

D. Post-Installed Anchors: Torque-controlled expansion anchors or chemical anchors capable of sustaining, without failure, a load equal to six times the load imposed when installed in unit masonry and four times the load imposed when installed in concrete, as determined by testing according to ASTM E 488, conducted by a qualified independent testing agency.

1. Material for Interior Locations: Carbon-steel components zinc plated to comply with ASTM B 633 or ASTM F 1941 (ASTM F 1941M), Class Fe/Zn 5, unless otherwise indicated.

2. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 (A1) stainless-steel bolts, ASTM F 593 (ASTM F 738M), and nuts, ASTM F 594 (ASTM F 836M).

2.4 MISCELLANEOUS MATERIALS

A. Shop Primers: Provide primers that comply with Section 099113 "Exterior Painting," Section 099123 "Interior Painting," and Section 099600 "High-Performance Coatings."

B. Shop Primer for Galvanized Steel: Primer formulated for exterior use over zinc-coated metal and compatible with finish paint systems indicated.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. 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.

2.5 FABRICATION, GENERAL

A. Provide complete stair assemblies, including metal framing, hangers, 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.
3. Fabricate treads and platforms of exterior stairs so finished walking surfaces slope to drain.

B. Form exposed work with accurate angles and surfaces and straight edges.

C. 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 4 welds: good quality, uniform undressed weld with minimal splatter.

D. Fabricate joints that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

2.6 STEEL-FRAMED STAIRS

A. NAAMM Stair Standard: Comply with "Recommended Voluntary Minimum Standards for Fixed Metal Stairs" in NAAMM AMP 510, "Metal Stairs Manual," industrial 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 indicated.
3. Weld or bolt stringers to headers; weld or bolt framing members to stringers and headers.

C. Metal Floor Plate Stairs: Form treads and platforms to configurations shown from rolled-steel abrasive-surface floor plate of thickness needed to comply with performance requirements, but not less than 1/4 inch (6.4 mm) [**indicated**].

1. Form treads with integral nosing and back edge stiffener. Form risers of same material as treads.
2. Form treads with integral nosing and back edge stiffener. Form risers from steel sheet not less than 0.097 inch (2.5 mm) thick, welded to tread nosings and stiffeners and to platforms.
3. Form treads with integral nosing and back edge stiffener and with open risers.
4. Weld steel supporting brackets to stringers and weld treads to brackets.
5. Fabricate platforms with integral nosings matching treads and weld to platform framing.

2.7 STAIR RAILINGS

A. Comply with applicable requirements in Section 055213 "Pipe and Tube Railings."

1. Rails may be bent at corners, rail returns, and wall returns, instead of using prefabricated fittings.
2. Connect posts to stair framing by direct welding unless otherwise indicated.

2.8 FINISHES

A. Finish metal stairs after assembly.

B. Galvanizing: Hot-dip galvanize items as indicated to comply with ASTM A 153/A 153M for steel and iron hardware and with ASTM A 123/A 123M for other steel and iron products.

1. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.

2. Fill vent and drain holes that will be exposed in finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

C. Preparation for Shop Priming: Prepare uncoated ferrous-metal surfaces to comply with minimum requirements indicated below for SSPC surface preparation specifications and environmental exposure conditions of installed products:

1. Exterior Stairs: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
2. Interior Stairs: SSPC-SP 6/NACE No. 3, "Commercial Blast Cleaning."
3. Interior Stairs: SSPC-SP 3, "Power Tool Cleaning."

D. Apply shop primer to uncoated surfaces of metal stair components, except those with galvanized finishes and those to be embedded in concrete or masonry unless otherwise indicated. Comply with SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting.

1. Stripe paint corners, crevices, bolts, welds, and sharp edges.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing metal stairs to in-place construction. Include threaded fasteners for concrete and masonry inserts, through-bolts, lag bolts, and other connectors.

B. Cutting, Fitting, and Placement: Perform cutting, drilling, and fitting required for installing metal stairs. Set units accurately in location, alignment, and elevation, measured from established lines and levels and free of rack.

C. Field Welding: Comply with requirements for welding in "Fabrication, General" Article.

3.2 INSTALLING METAL STAIRS WITH GROUTED BASEPLATES

A. Clean concrete and masonry bearing surfaces of bond-reducing materials, and roughen to improve bond to surfaces. Clean bottom surface of baseplates.

B. Set steel stair baseplates on wedges, shims, or leveling nuts. After stairs have been positioned and aligned, tighten anchor bolts. Do not remove wedges or shims but, if protruding, cut off flush with edge of bearing plate before packing with grout.

1. Use nonmetallic, nonshrink grout unless otherwise indicated.
2. Pack grout solidly between bearing surfaces and plates to ensure that no voids remain.

3.3 ADJUSTING AND CLEANING

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

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

B. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Section 099113 "Exterior Painting" and Section 099123 "Interior Painting."

C. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780/A 780M.

END OF SECTION 055116

SECTION 055213 - PIPE AND TUBE RAILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Steel pipe and tube railings.

1.3 PERFORMANCE REQUIREMENTS

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

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

1. Steel: 72 percent of minimum yield strength.

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

1. Handrails and Top Rails of Guards:

a. Uniform load of 50 lbf/ ft. applied in any direction.
b. Concentrated load of 200 lbf applied in any direction.
c. Uniform and concentrated loads need not be assumed to act concurrently.

2. Infill of Guards:

a. Concentrated load of 50 lbf applied horizontally on an area of 1 sq. ft..
b. Infill load and other loads need not be assumed to act concurrently.

D. 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, ambient; 180 deg F, material surfaces.

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

1.4 SUBMITTALS

A. Product Data: For the following:

1. Manufacturer's product lines of mechanically connected railings.
2. Grout, anchoring cement, and paint products.

B. Shop Drawings: Include plans, elevations, sections, details, and attachments to other work.

C. Samples for Initial Selection: For products involving selection of color, texture, or design.

D. Samples for Verification: For each type of exposed finish required.

1. Sections of each distinctly different linear railing member, including handrails, top rails, posts, and balusters.
2. Fittings and brackets.

E. Delegated-Design Submittal: For installed products indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

F. Qualification Data: For qualified professional engineer] .

G. Welding certificates.

H. Paint Compatibility Certificates: From manufacturers of topcoats applied over shop primers certifying that shop primers are compatible with topcoats.

1.5 QUALITY ASSURANCE

A. Source Limitations: Obtain each type of railing from single source from single manufacturer.

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

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

1. AWS D1.1/D1.1M, "Structural Welding Code - Steel."

1.6 PROJECT CONDITIONS

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

1.7 COORDINATION AND SCHEDULING

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

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

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

PART 2 - PRODUCTS

2.1 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. Steel Pipe and Tube Railings:

a. Pisor Industries, Inc.
b. Wagner, R & B, Inc.; a division of the Wagner Companies.

2.2 METALS, GENERAL

A. Metal Surfaces, General: Provide materials with smooth surfaces, without seam marks, roller marks, rolled trade names, stains, discolorations, or blemishes.

B. Brackets, Flanges, and Anchors: Cast or formed metal of same type of material and finish as supported rails unless otherwise indicated.

2.3 STEEL AND IRON

A. Tubing: ASTM A 500 (cold formed) or ASTM A 513.

B. Pipe: ASTM A 53/A 53M, Type F or Type S, Grade A, Standard Weight (Schedule 40), unless another grade and weight are required by structural loads.

1. Provide galvanized finish for exterior installations and where indicated.

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

2.4 FASTENERS

A. General: Provide the following:
1. 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.

B. Fasteners for Anchoring Railings to Other Construction: Select fasteners of type, grade, and class required to produce connections suitable for anchoring railings to other types of construction indicated and capable of withstanding design loads.
1. Material for Exterior Locations and Where Stainless Steel is Indicated: Alloy Group 1 stainless-steel bolts, ASTM F 593, and nuts, ASTM F 594.

2.5 MISCELLANEOUS MATERIALS

A. Welding Rods and Bare Electrodes: Select according to AWS specifications for metal alloy welded.

B. Etching Cleaner for Galvanized Metal: Complying with MPI#25.

C. Galvanizing Repair Paint: High-zinc-dust-content paint complying with SSPC-Paint 20 and compatible with paints specified to be used over it.

D. Shop Primers: Provide primers that comply with Division 09 painting Sections and Division 09 Section "High-Performance Coatings."

1. Products: Subject to compliance with requirements, :

E. Shop Primer for Galvanized Steel: Water based galvanized metal primer complying with MPI#134.

F. Intermediate Coats and Topcoats: Provide products that comply with Division 09 painting Sections and Division 09 Section "Exterior painting."

G. Epoxy Intermediate Coat: Complying with MPI #77 and compatible with primer and topcoat.

H. Polyurethane Topcoat: Complying with MPI #72 and compatible with undercoat.

I. Bituminous Paint: Cold-applied asphalt emulsion complying with ASTM D 1187.

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

K. Anchoring Cement: Factory-packaged, nonshrink, nonstaining, hydraulic-controlled expansion cement formulation for mixing with water at Project site to create pourable anchoring, patching, and grouting compound.

1. 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.

2.6 FABRICATION

A. General: Fabricate railings to comply with requirements indicated for design, dimensions, member sizes and spacing, details, finish, and anchorage, but not less than that required to support structural loads.

B. Assemble railings in the shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for reassembly and coordinated installation. Use connections that maintain structural value of joined pieces.

C. Cut, drill, and punch metals cleanly and accurately. Remove burrs and ease edges to a radius of approximately 1/32 inch unless otherwise indicated. Remove sharp or rough areas on exposed surfaces.

D. Form work true to line and level with accurate angles and surfaces.

E. Fabricate connections that will be exposed to weather in a manner to exclude water. Provide weep holes where water may accumulate.

F. Cut, reinforce, drill, and tap as indicated to receive finish hardware, screws, and similar items.

G. Connections: Fabricate railings with welded connections unless otherwise indicated.

H. Welded Connections: 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.

I. Bend members in jigs to produce uniform curvature for each configuration required; maintain cross section of member throughout entire bend without buckling, twisting, cracking, or otherwise deforming exposed surfaces of components.

J. Close exposed ends of railing members with prefabricated end fittings.

K. Provide wall returns at ends of wall-mounted handrails unless otherwise indicated. Close ends of returns unless clearance between end of rail and wall is 1/4 inch or less.

L. 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.

M. Provide inserts and other anchorage devices for connecting railings to concrete or masonry work. Fabricate anchorage devices capable of withstanding loads imposed by railings. Coordinate anchorage devices with supporting structure.

N. For railing posts set in concrete, provide stainless-steel sleeves not less than 6 inches (150 mm) long with inside dimensions not less than 1/2 inch (13 mm) greater than outside dimensions of post, with metal plate forming bottom closure.

O. Woven-Wire Mesh Infill Panels: Fabricate infill panels from woven-wire mesh crimped into 1-by-1/2-by-1/8-inch metal channel frames. Make wire mesh and frames from same metal as railings in which they are installed.

1. Orient wire mesh with wires perpendicular and parallel to top rail.

2.7 FINISHES, GENERAL

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

B. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

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

D. Provide exposed fasteners with finish matching appearance, including color and texture, of railings.

2.8 STEEL AND IRON FINISHES

A. Galvanized Railings:

1. Hot-dip galvanize exterior steel and iron railings, including hardware, after fabrication.
2. Do not quench or apply post galvanizing treatments that might interfere with paint adhesion.
3. Fill vent and drain holes that will be exposed in the finished Work, unless indicated to remain as weep holes, by plugging with zinc solder and filing off smooth.

B. For galvanized railings, provide hot-dip galvanized fittings, brackets, fasteners, sleeves, and other ferrous components.

C. Preparing Galvanized Railings for Shop Priming: After galvanizing, thoroughly clean railings of grease, dirt, oil, flux, and other foreign matter, and treat with etching cleaner.

D. Primer Application: Apply shop primer to prepared surfaces of railings unless otherwise indicated. Comply with requirements in SSPC-PA 1, "Paint Application Specification No. 1: Shop, Field, and Maintenance Painting of Steel," for shop painting. Primer need not be applied to surfaces to be embedded in concrete or masonry.

E. Shop-Painted Finish: Comply with Division 09 Section "Painting."

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

PART 3 - EXECUTION

3.1 EXAMINATION

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

3.2 INSTALLATION, GENERAL

A. Fit exposed connections together to form tight, hairline joints.

B. Perform cutting, drilling, and fitting required for installing railings. Set railings accurately in location, alignment, and elevation; measured from established lines and levels and free of rack.

1. Do not weld, cut, or abrade surfaces of railing components that have been coated or finished after fabrication and that are intended for field connection by mechanical or other means without further cutting or fitting.
2. Set posts plumb within a tolerance of 1/16 inch in 3 feet.
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.

C. Corrosion Protection: Coat concealed surfaces of aluminum that will be in contact with grout, concrete, masonry, wood, or dissimilar metals, with a heavy coat of bituminous paint.

D. Adjust railings before anchoring to ensure matching alignment at abutting joints.

E. Fastening to In-Place Construction: Use anchorage devices and fasteners where necessary for securing railings and for properly transferring loads to in-place construction.

3.3 RAILING CONNECTIONS

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

B. Expansion Joints: Install expansion joints at locations indicated but not farther apart than required to accommodate thermal movement. Provide slip-joint internal sleeve extending 2 inchesbeyond joint on either side, fasten internal sleeve securely to one side, and locate joint within 6 inchesof post.

3.4 ANCHORING POSTS

A. Use metal sleeves preset and anchored into concrete for installing posts. After posts have been inserted into sleeves, fill annular space between post and sleeve with nonshrink, nonmetallic grout, mixed and placed to comply with anchoring material manufacturer's written instructions.

B. Form or core-drill holes not less than 5 inchesdeep and 3/4 inchlarger than OD of post for installing posts in concrete. Clean holes of loose material, insert posts, and fill annular space between post and concrete with nonshrink, nonmetallic grout , mixed and placed to comply with anchoring material manufacturer's written instructions.

C. Leave anchorage joint exposed with 1/8-inchbuildup, sloped away from post.

3.5 ATTACHING RAILINGS

A. Anchor railing ends at walls with round flanges anchored to wall construction and welded to railing ends .

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.

3.6 ADJUSTING AND CLEANING

A. Touchup Painting: Cleaning and touchup painting of field welds, bolted connections, and abraded areas of shop paint are specified in Division 09 painting Sections and Division 09 Section "High-Performance Coatings."

B. Galvanized Surfaces: Clean field welds, bolted connections, and abraded areas and repair galvanizing to comply with ASTM A 780.

3.7 PROTECTION

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

END OF SECTION 055213

PART 1 - GENERAL

1.01 SUMMARY

A. Section Includes: Provide solid surfacing fabrications including but not limited to following:

1. window sills.
2. vanity tops.
3. millwork counter tops with sinks and cove backsplashes.

1.02 REFERENCES

A. Abbreviations and Acronyms:

1. LEED®: Leadership in Energy and Environmental Design; www.cagbc.org.
2. MDF: Medium Density Fiberboard.
3. SCAQMD: South Coast Air Quality Management District; www.aqmd.gov.
4. VOC: Volatile Organic Compound.

B. Definitions:

1. Solid Surface: Non-porous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment.

C. Reference Standards:

1.	ANSI/NPA A208.2-09	- Medium Density Fiberboard (MDF) For Interior Applications
2.	ASTM C920-14a	- Standard Specification for Elastomeric Joint Sealants
3.	ASTM D638-10	- Standard Test Method for Tensile Properties of Plastics
4.	ASTM D785-08	- Standard Test Method for Rockwell Hardness of Plastics and Electrical Insulating Materials
5.	ASTM D790-10	- Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials
6.	ASTM D5420-10	- Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)
7.	ASTM E84-14	- Standard Test Method for Surface Burning Characteristics of Building Materials
8.	ASTM E228-11	- Standard Test Method for Linear Thermal Expansion of Solid Materials with a Push-Rod Dilatometer
9.	ASTM G21-13	- Standard Practice for Determining Resistance of Synthetic Polymeric Materials to Fungi
10.	ASTM G22-76(96)	- Standard Practice for Determining Resistance of Plastics to Bacteria
11.	ASTM G155-13	- Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials
12.	CSA B45.5-11/ IAPMO Z124-2011	- Plastic Plumbing Fixtures
13.	NFPA 255-06	- Standard Method of Test of Surface Burning Characteristics of Building Materials
14.	NSF/ANSI 51-07	- Food Equipment Materials
15.	SCAQMD Rule 1168	- Adhesive and Sealant Applications (amended January 2005)
16.	UL 723	- Standard for Test for Surface Burning Characteristics of Building Materials

17.	UL Environment/ GREENGUARD UL 2818	- Standard for Chemical Emissions for Building Materials, - Finishes and Furnishings, Section 7.1
18.	UL Environment/ GREENGUARD UL 2818	- Gold Standard for Chemical Emissions for Building Materials, - Finishes and Furnishings, Section 7.1 and 7.2
19.	UL 2824	- GREENGUARD Certification Program, Method for Measuring Microbial Resistance from Various Sources Using Static Environmental Chambers

1.03 ADMINISTRATIVE REQUIREMENTS

A. Preinstallation Meetings: Arrange preinstallation meeting 1 week prior to commencing work with all parties associated with trade as designated in Contract Documents or as requested by Architect. Presided over by Contractor, include Architect who may attend, Subcontractor performing work of this trade, Owner's representative, testing company's representative and consultants of applicable discipline. Review Contract Documents for work included under this trade and determine complete understanding of requirements and responsibilities relative to work included, storage and handling of materials, materials to be used, installation of materials, sequence and quality control, Project staffing, restrictions on areas of work and other matters affecting construction, to permit compliance with intent of work of this Section.

1.04 SUBMITTALS

A. Product Data: Indicate Product description including solid surface sheets, sinks, bowls and illustrating full range of standard colors, fabrication information and compliance with specified performance requirements. Submit Product data with resistance to list of chemicals.

B. Shop Drawings: Submit Shop Drawings for work of this Section in accordance with Section 01 30 00. Indicate plans, sections, dimensions, component sizes, edge details, thermosetting requirements, fabrication details, attachment provisions, sizes of furring, blocking, including concealed blocking and coordination requirements with adjacent work. Show locations and sizes of cutouts and holes for plumbing fixtures, faucets, soap dispensers, waste receptacles and other items installed in solid surface.

C. Coordination Drawings: Submit coordination drawings indicating plumbing and miscellaneous steel work indicating locations of wall rated or non-rated, blocking requirements, locations and recessed wall items and similar items.

D. Samples: Submit samples in accordance with Section 01 30 00. Submit minimum 6" x 6" samples. Cut sample and seam together for representation of inconspicuous seam. Indicate full range of color and pattern variation. Approved samples will be retained as standards for work.

E. Test and Evaluation Reports: Submit flammability test reports [and food preparation zone certifications/listing confirming compliance with NSF/ANSI 51. Refer to www.nsf.org for the latest compliance to NSF/ANSI 51 for Food Zone — all food types.]

1.05 CLOSEOUT SUBMITTALS

A. Operational and Maintenance Data:

1. Submit manufacturer's care and maintenance data, including repair and cleaning instructions. Include in Project closeout documents.
2. Provide a commercial care and maintenance kit and video. Review maintenance procedures and warranty details with Owner upon completion.

1.06 QUALITY ASSURANCE

A. Qualifications:

1. Installers: Provide work of this Section executed by competent installers with minimum 5 years experience in the application of Products, systems and assemblies specified and with approval and training of the Product manufacturers.

B. Mock-Ups:

1. Prior to final approval of Shop Drawings, erect 1 full size mock-up of each component at Project site demonstrating quality of materials and execution for Architect review.
2. Should mock-up not be approved, rework or remake until approval is secured. Remove rejected units from Project site.

3. Approved mock-up will be used as standard for acceptance of subsequent work.
4. Approved mock-ups may remain as part of finished work.

1.07 DELIVERY, STORAGE AND HANDLING

A. Delivery and Acceptance Requirements: Deliver no components to Project site until areas are ready for installation.

B. Storage and Handling Requirements:

1. Store components indoors prior to installation.
2. Handle materials to prevent damage to finished surfaces.

1.08 WARRANTY

A. Manufacturer Warranty: Provide manufacturer's standard warranty for material only for period of 10 years against defects and/or deficiencies in accordance with General Conditions of the Contract. Promptly correct any defects or deficiencies which become apparent within warranty period, to satisfaction of Architect and at no expense to Owner.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Manufacturer List: Products of following manufacturers are acceptable subject to conformance to requirements of Drawings, Schedules and Specifications:

1. Corian® by DuPont; www.corian.com

B. Substitution Limitations: This Specification is based on Corian® Products. Comparable Products from manufacturers listed herein will be accepted provided they meet requirements of this Specification.

2.02 MATERIALS

A. Performance/Design Criteria:

	Property	Requirement (min or max)	Test Procedure
1.	Solid Surface Based Products:		
a.	Tensile Strength	6000 psi min	ASTM D638
b.	Tensile Modulus	1.5 x 10^6 psi min	ASTM D638
c.	Tensile Elongation	0.4% min.	ASTM D638
d.	Flexural Strength	10000 psi min	ASTM D790
e.	Flexural Modulus	1.2 x 10^6 psi min	ASTM D790
f.	Hardness	>85-Rockwell "M" scale min.	ASTM D785
g.	Thermal Expansion	2.2 x 10^{-5} in./in./°F	ASTM E228
h.	Fungi and Bacteria	Does not support microbial growth	ASTM G21 & G22
i.	Microbial Resistance	Highly resistant to mold growth	UL 2824
j.	Ball Impact	No fracture - 1/2 lb. Ball: 6 mm slab - 36" drop 12 mm slab - 144" drop	NEMA LD 3, Method 3.8

k.	Weatherability	ΔE*94<5 in 1,000 hrs		ASTM G155
l.	Flammability			ASTM E84, NFPA 255 & UL 723

		All Colors		
		6 mm	**12 mm**	
m.	Flame Spread	<25	<25	
n.	Smoke Developed	<25	<25	
o.	Class	A	A	NFPA 101®, Life Safety Code

B. Solid Surface Material:

C. Non-porous, homogeneous material maintaining the same composition throughout the part with a composition of acrylic polymer, aluminum trihydrate filler and pigment; not coated, laminated or of composite construction; meeting following criteria:

D. Flammability: Class 1 and A when tested to UL 723.

E. Adhesive for Bonding to Other Products: One component silicone to ASTM C920.

F. Sealant: A standard mildew-resistant, FDA/UL® [and NSF/ANSI 51 compliant in Food Zone area,] recognized silicone color matched sealant or clear silicone sealants.

G. Sink/Bowl Mounting Hardware: Manufacturer's approved bowl clips, brass inserts and fasteners for attachment of undermount sinks/bowls.

H. Heat Reflecting Tape: Manufacturer’s standard aluminum foil tape, with required thickness, for use with cutouts near heat sources.

I. Insulating Nomex® Fabric: Manufacturer’s standard for use with conductive tape in insulating solid surface material from adjacent heat source.

2.03 COMPONENTS

A. Window Sills: 1/2" thick solid surfacing material, adhesively joined with inconspicuous seams, edge details as indicated on Drawings. Color selected later by Architect from manufacturer’s full color range.

B. Counter Perimeter Frame: Ensure 1/2" [3/4"] thick, moisture resistant [cores for counter tops in wet areas having sinks or lavatories are 3/4" thick exterior grade plywood with waterproof adhesive, Fir or Poplar plywood, veneer core only.] [MDF core conforming to ANSI/NPA A208.2 balanced design, manufactured from recycled materials, meeting ANSI Standards for emissions, of minimum density of 48 lb/cu ft and surface character to match sample approved by Architect. Ensure fire retardant Product contains fire-retardant chemicals injected with raw materials during manufacturing and achieves a maximum flame-spread rating of 25 with a maximum smoke development of 200 when tested to ASTM E84.]

C. Acceptable Product: “DuPont™ Corian® Charging Unit – Individual” by DuPont.

D. Fabrication:

1. Fabricate components in shop to greatest extent practical to sizes and shapes indicated, in accordance with approved Shop Drawings and solid polymer manufacturer requirements. Form joints between components using manufacturer's standard joint adhesive without conspicuous joints. Provide factory cutouts for plumbing fittings and bath accessories as indicated on Drawings.
2. Where indicated, thermoform corners and edges or other objects to shapes and sizes indicated on Drawings, prior to seaming and joining. Cut components larger than finished dimensions and sand edges to remove nicks and scratches. Heat entire component uniformly prior to forming.
3. Ensure no blistering, whitening and cracking of components during forming.
4. Fabricate backsplashes from solid surfacing material with optional radius cove where counter and backsplashes meet as indicated on Drawings. Backsplashes for most colors may be fabricated by traditional means discussed in K-25294 *Backsplashe*s. Colors with metallic/mica particle or veined colors creating directional aesthetics (K-26833 *Directional Aesthetics*) may require the techniques in Technical Bulletin K-28235 *Thermoformed Backsplash*.
5. Fabricate joints between components using manufacturer's standard joint adhesive. Ensure joints are inconspicuous in appearance and without voids. Attach 50 mm (2") wide reinforcing strip of solid polymer material under each joint. Reinforcing strip of solid polymer material is not required when using DuPont™ Joint Adhesive 2.0.
6. Provide holes and cutouts for plumbing and bath accessories as indicated on Drawings.
7. Rout and finish component edges to a smooth, uniform finish. Rout cutouts, then sand edges smooth. Repair or reject defective or inaccurate work.

8. Finish: Ensure surfaces have uniform finish:

    a. Matte, with a 60° gloss rating of 5 - 20.

9. Fabrication Tolerances:

    a. Variation in Component Size: +/-1/8".
    b. Location of Openings: +/-1/8" from indicated location.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of Conditions:

1. Examine substrates and conditions, with fabricator present for compliance with requirements for installation tolerances and other conditions affecting performance of work. Proceed with installation only after unsatisfactory conditions have been corrected.
2. Verify actual site dimensions and location of adjacent materials prior to commencing work.
3. Examine cabinets upon which counter tops are to be installed. Verify cabinets are level to within 1/8" in 10' - 0".
4. Notify Architect in writing of any conditions which would be detrimental to installation.

B. Evaluation and Assessment: Commencement of work implies acceptance of previously completed work.

3.02 INSTALLATION

A. Install components plumb, level, rigid, scribed to adjacent finishes in accordance with reviewed Shop Drawings and Product installation details.

B. Fabricate field joints using manufacturer's recommended adhesive, with joints being inconspicuous in finished work. Exposed joints/seams are not permitted. Keep components and hands clean when making joints. Reinforce field joints as specified herein. Cut and finish component edges with clean, sharp returns.

C. Route radii and contours to template. Anchor securely to base component or other supports. Align adjacent components and form seams to comply with manufacturer’s written recommendations using adhesive in color to match work. Carefully dress joints smooth, remove surface scratches and clean entire surface.

D. Install countertops with no more than 1/8" sag, bow or other variation from a straight line.

E. Adhere undermount/submount/bevel mount sinks/bowls to countertops using manufacturer's recommended adhesive and mounting hardware.

F. Adhere topmount sinks/bowls to countertops using manufacturer recommended adhesives and color-coordinated silicone sealant. [Secure seam mount bowls and sinks to counter tops using color matched joint adhesive.]

G. Seal between wall and components with joint sealant as specified herein and in Section 07 92 00, as applicable.

H. Provide backsplashes and endsplashes as indicated on Drawings. Adhere to countertops using a standard color-coordinated silicone sealant. Adhere applied sidesplashes to countertops using a standard color-matched silicone sealant. Provide coved backsplashes and sidesplashes at walls and adjacent millwork. Fabricate radius cove at intersection of counters with backsplashes to dimensions shown on reviewed Shop Drawings. Adhere to countertops using manufacturer’s standard color-coordinated joint adhesive.

I. Keep components and hands clean during installation. Remove adhesives, sealants and other stains. Ensure components are clean on date of Substantial Completion of the Work.

J. Coordinate connections of plumbing fixtures with [Division 22] [Mechanical]. Make plumbing connections to sinks in accordance with [Division 22] [Mechanical].

3.03 REPAIR

A. Repair minor imperfections and cracked seams and replace areas of severely damaged surfaces in accordance with manufacturer’s “Technical Bulletins”.

3.04 SITE QUALITY CONTROL

A. Non-Conforming Work: Replace damaged work which cannot be satisfactorily repaired, restored or cleaned, to satisfaction of Architect at no cost to Owner.

3.05 CLEANING

A. Remove excess adhesive and sealant from visible surfaces.

B. Clean surfaces in accordance with manufacturer's "Care and Maintenance Instructions".

3.06 PROTECTION

A. Provide protective coverings to prevent physical damage or staining following installation for duration of Project.

B. Protect surfaces from damage until date of Substantial Completion of the Work.

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END OF SECTION

SECTION 072100 - THERMAL INSULATION

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Glass-fiber blanket insulation.

1.2 ACTION SUBMITTALS

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

1.3 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each product, for tests performed by a qualified testing agency.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Protect insulation materials from physical damage and from deterioration due to moisture, soiling, and other sources. Store inside and in a dry location. Comply with manufacturer's written instructions for handling, storing, and protecting during installation.

B. Protect foam-plastic board insulation as follows:

   1. Do not expose to sunlight except to necessary extent for period of installation and concealment.
   2. Protect against ignition at all times. Do not deliver foam-plastic board materials to Project site until just before installation.
   3. Quickly complete installation and concealment of foam-plastic board insulation in each area of construction.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Surface-Burning Characteristics: Maximum flame-spread and smoke-developed indexes less than [**Class A, 25 and 450**] when tested in accordance with ASTM E84.

B. Fire-Resistance Ratings: Comply with ASTM E119 or UL 263; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

   1. Indicate design designations from UL's "Fire Resistance Directory" or from listings of another qualified testing agency.

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C. Fire Propagation Characteristics: Passes NFPA 285 testing as part of an approved assembly.

D. Thermal-Resistance Value (R-Value): [**R-value as indicated on Drawings**] in accordance with ASTM C518.

2.2 GLASS-FIBER BLANKET INSULATION

A. Glass-Fiber Blanket Insulation, Unfaced: ASTM C665, Type I; passing ASTM E136 for combustion characteristics.

1. Manufacturers: Subject to compliance with requirements, provide products by one of the following :

a. CertainTeed; SAINT-GOBAIN
b. Johns Manville; a Berkshire Hathaway company
c. Knauf Insulation
d. Owens Corning

2.3 INSULATION FASTENERS

A. Insulation Fastener Accessories: Provide [**double-pointed weld pins,**][**lagging pins,**][**quilting pins,**][**duct liner pins,**][**insulation hangers,**][**specialty washers,**][**special caps,**][**j-hooks,**][**capacitor discharge annular weld pins,**][**capacitor discharge acoustical lagging pins,**] and other accessory materials that are recommended in writing by insulation fastener manufacturer to produce complete insulation supports.

PART 3 - EXECUTION

3.1 PREPARATION

A. Clean substrates of substances that are harmful to insulation, including removing projections capable of puncturing insulation or vapor retarders, or those that interfere with insulation attachment.

3.2 INSTALLATION, GENERAL

A. Comply with insulation manufacturer's written instructions applicable to products, applications and applicable codes.

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. Install insulation with manufacturer's R-value label exposed after insulation is installed.

D. Extend insulation to envelop entire area to be insulated. Fit tightly around obstructions and fill voids with insulation. Remove projections that interfere with placement.

E. 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.

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3.3 INSTALLATION OF SLAB INSULATION

A. On vertical slab edge and foundation surfaces, set insulation units using manufacturer's recommended adhesive in accordance with manufacturer's written instructions.

1. If not otherwise indicated, extend insulation a minimum of [**24 inches**] below exterior grade line.

B. On horizontal surfaces, loosely lay insulation units in accordance with manufacturer's written instructions. Stagger end joints and tightly abut insulation units.

1. If not otherwise indicated, extend insulation a minimum of [**24 inches**] in from exterior walls.

3.4 INSTALLATION OF FOUNDATION WALL INSULATION

A. Butt panels together for tight fit.

B. Anchor Installation: Install board insulation on concrete substrates by adhesively attached, spindle-type insulation anchors as follows:

1. Fasten insulation anchors to concrete substrates with insulation anchor adhesive in accordance with anchor manufacturer's written instructions.
2. Space anchors in accordance with insulation manufacturer's written instructions for insulation type, thickness, and application.
3. Apply insulation standoffs to each spindle to create cavity width indicated on Drawings between concrete substrate and insulation.
4. After adhesive has dried, install board insulation by pressing insulation into position over spindles and securing it tightly in place with insulation-retaining washers, taking care not to compress insulation.
5. Where insulation will not be covered by other building materials, apply capped washers to tips of spindles.

C. Adhesive Installation: Install with adhesive or press into tacky waterproofing or dampproofing in accordance with manufacturer's written instructions.

3.5 INSTALLATION OF CAVITY-WALL INSULATION
3.6 INSTALLATION OF INSULATION IN FRAMED CONSTRUCTION

A. Blanket Insulation: Install in cavities formed by framing members in accordance with the following requirements:

1. Use insulation widths and lengths that fill the cavities formed by framing members. If more than one length is required to fill the cavities, provide lengths that will produce a snug fit between ends.
2. Place insulation in cavities formed by framing members to produce a friction fit between edges of insulation and adjoining framing members.
3. Maintain **3-inch** clearance of insulation around recessed lighting fixtures not

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rated for or protected from contact with insulation.

4. For metal-framed wall cavities where cavity heights exceed **96 inches**, support unfaced blankets mechanically and support faced blankets by taping flanges of insulation to flanges of metal studs.
5. Where glass-fiber blankets are indicated for sound attenuation above ceilings, install unfaced blanket insulation over ceiling area in thickness indicated. Where partitions occur, extend insulation up either side of partition.
6. For wood-framed construction, install blankets in accordance with ASTM C1320 and as follows:

    a. With faced blankets having stapling flanges, lap blanket flange over flange of adjacent blanket to maintain continuity of vapor retarder once finish material is installed over it.

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.**.
2. Detailing Foam Insulation for Voids: Apply in accordance with manufacturer's written instructions.

C. Loose-Fill Insulation: Apply in accordance with ASTM C1015 and manufacturer's written instructions.

1. Level horizontal applications to uniform thickness as indicated, lightly settle to uniform density, but do not compact excessively.
2. For cellulosic-fiber loose-fill insulation, comply with the Cellulose Insulation Manufacturers Association's Technical Bulletin #2, "Standard Practice for Installing Cellulose Building Insulation."

D. Spray-Applied Cellulosic Insulation: Apply spray-applied insulation in accordance with manufacturer's written instructions.

1. Do not apply insulation until installation of pipes, ducts, conduits, wiring, and electrical outlets in walls is completed and windows, electrical boxes, and other items not indicated to receive insulation are masked.
2. After insulation is applied, make flush with face of studs by using method recommended by insulation manufacturer.

3.7 PROTECTION

A. Protect installed insulation from damage due to harmful weather exposures, physical abuse, and other causes.

B. Provide temporary coverings or enclosures where insulation is subject to abuse and cannot be concealed and protected by permanent construction immediately after installation.

END OF SECTION 072100

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GEORGIA PACIFIC BUILDING PRODUCTS, LLC
SECTION 07 27 26 INTERGRATED GYPSUM SHEAHTING WATER-RESISTANT BARRIER AND AIR-BARRIER

SPECIFIER NOTE: This specification section is designed to provide guidance when specifying **DensElement® Barrier System**

DensElement® Barrier System: Is an integrated gypsum sheathing with AquaKOR™ technology that transforms the entire gypsum sheathing into a WRB-AB by integrating the fiberglass mat and gypsum core to form a monolithic, hydrophobic surface that blocks bulk water but allows vapor to pass-through.

BASIC USE: DensElement® Barrier System is used as the exterior wall sheathing, the water resistive barrier, and the air barrier as required by building code when the panel joints, fasteners, penetrations, openings and transitions are properly sealed by an approved fluid applied flashing per the manufacturer's recommendations. The DensElement Barrier System can be used under a wide range of adhered, attached and rainscreen cladding systems. These include EIFS, cavity brick and claddings such as wood, vinyl, fiber cement, composite sidings and rainscreen claddings such as insulated metal panels.

SUMMERY OF BENEFITS:
The DensElement Barrier System eliminates the need for attached building wrap, fluid applied membranes or self-adhered membranes over the field of the sheathing that have typically served as the water resistive barrier and air barrier for building code compliance. The DensElement Barrier System Sheathing is attached directly to wood or steel framing with recommended fasteners. DensElement® Barrier System creates a high-performing robust barrier that helps keep bulk water out, but remains permeable, which allows water vapor to escape and promote drying. The DensElement® Barrier System helps prevent air infiltration for a more energy efficient structure. The DensElement® Barrier may be fully exposed to UV and normal weather conditions for up to 12 months after installation.

FOR TECHNICAL OR SALES SUPPORT CONTACT:
Georgia-Pacific Building Products, LLC
133 Peachtree Street, NE
9th floor
Atlanta, GA 30303
1-800-225-6119
www.buildgp.com

SALES INFORMATION AND ORDER PLACEMENT
U.S.A. Pacific Southwest: **1-800-824-7503**
Midwest: **1-800-876-4746**
Central: **1-800-231-6060 x 7709**
North: **1-800-947-4497**
Pacific Northwest: **1-800-444-0092**
South: **1-800-327-2344**
CANADA Canada Toll Free: **1-800-387-6823**

SECTION 07 2500
INTERGRATED GYPSUM SHEATHING WATER-RESISTANT BARRIER AND AIR-BARRIER

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Work of this section includes coated fiberglass-mat gypsum sheathing board system with integral Water-Resistant Barrier (WRB) and air barrier (AB) features, and all components and accessory materials required for covering sheathing joints, fasteners, penetrations, rough openings, and material transitions, for use under exterior wall claddings.

B. Fluid-applied. Self-adhered, vapor-permeable, membrane air barrier

Specifier: The DensElement® Barrier System specified herein replaces all exterior wall sheathing, plastic sheet air barriers, self-adhering air barriers and fluid-applied air barriers. Therefore, delete all other air barriers / weather resistant barrier products from the specifications, and delete exterior wall sheathing from Division 6. If including this optional RELATED SECTIONS, please only include the sections included in the project manual.

1.2 RELATED SECTIONS

A. Division 01 Section "Sustainable Design Requirements" for additional requirements, including [LEED] documentation requirements.

B. [Section 014000 Quality Requirements;] [Section 014529 Testing Laboratory Services;] [Section 014533 Code-Required Special Inspections and Procedures;] coordination with owners' independent testing and inspection agency

C. Section 014339 Mock-Ups; exterior wall mock-ups

D. Section 015000 Temporary Facilities and Controls; Work Schedule requirements to prevent weather or sunlight exposure beyond the manufacturer limits; project requirements to protect installed material prior to and during the enclosure work is completed.

E. Section 061600 Sheathing for air barrier substrates and joint treatment

F. Section 075000 Roofing Membrane; roof assembly and air barriers interface coordination and sequencing

G. Section 079200 Joint Sealants; sealant materials and installation techniques

H. Section 092900 Gypsum Board

I. Exterior wall claddings

1.3 DEFINITIONS

A. Air Barrier (AB): Airtight barrier made of material that is relatively air impermeable but moisture vapor permeable, with sealed joints and penetrations, and with terminations sealed to adjacent surfaces.

B. Water-Resistant Barrier (WRB): Water-shedding barrier made of material that is moisture-resistant, installed to shed water, with sealed joints and penetrations, and with terminations sealed to adjacent surfaces.
C. Rough Openings: Openings in the wall to accommodate windows and doors.
D. Material Transitions: Areas where the WRB / AB coated fiberglass-mat gypsum sheathing connects to beams, columns, slabs, parapets, foundation walls, roofing systems, and at the interface of dissimilar materials.

1.4 REFERENCE STANDARDS

A. AAMA- American Architectural Manufactures Association https://fgiaonline.org/

1. AAMA 711 Voluntary Specification for Self-Adhering Flashing Products Used for the Installation of Exterior Wall Fenestration Products.
2. AAMA 714 Voluntary Specification for Liquid Applied Flashing Used to Create a Water Resistive Seal Around Exterior Wall Openings in Buildings

B. ASTM- - American Society for testing and Material Standards www.astm.org

1. ASTM C473 Standard Test Method for Physical Testing of Gypsum Panel Products.
2. ASTM C1177 Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
3. ASTM C1280 Standard Specification for Application of Gypsum Sheathing.
4. ASTM D3273 Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber.
5. ASTM D412 Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers—Tension
6. ASTM E72 Standard Test Methods of Conducting Strength Tests of Panels for Building Construction.
7. ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials.
8. ASTM E119 Standard Test Method for Fire Tests of Building Construction and Materials.
9. ASTM E136 Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 C.
10. ASTM E84 Standard Test Method for Surface Burning Characteristics of Building Materials.
11. ASTM E2178 Standard Test Method for Air Permeance of Building Materials.
12. ASTM E2357 Standard Test Method for Determining Air Leakage of Air Barrier Assemblies.

C. Building Codes and Standards

1. 2015 ICC-ES AC 212 CIC ES Water-resistive Coatings Used as Water-resistive Barriers over Exterior Sheathing
2. 2021, 2018, 2015, and 2009 IBC International Building Code
3. 2021, 2018, 2015, 2012, and 2009 IRC International Residential Code
4. 2021, 2018, 2015, and 2009 IECC International Energy Conservation Code
5. US Environmental Protection Agency's AIM VOC regulations

D. Gypsum Association

1. GA-253 Application of Gypsum Sheathing

E. National Fire Protection Association
A. NFPA 285 Standard Fire Test Method for Evaluating of Fire Propagation Characteristics of Exterior Wall Assemblies Containing Combustible Components

1.5 SUBMITTALS
A. Submittals: Submit in accordance with Division 1 requirements.
B. Product Data and Installation Instructions: Submit manufacturer's product data including sheathing and accessory material types, composition, descriptions and properties, installation instructions and substrate preparation recommendations.
C. Shop Drawings: Submit shop drawings indicating locations and extent of WRB / AB system, including details of typical conditions, special joint conditions, intersections with other building envelope systems and materials; counter flashings and details showing bridging of envelope at substrate changes, details of sealing penetrations, and detailed flashing around windows and doors
D. Test Reports: Submit test reports indicating compliance with specified performance characteristics and requirements
E. Sample warranty: Submit a sample warranty identifying the terms and conditions of the warranty as herein specified.
F. Evaluation reports: Accredited laboratory testing for materials

1.6 WARRANTY
A. Provide manufacturer's standard warranty against in-place exposure damage (delamination, deterioration) for 12 (twelve) months of exposure to normal weather conditions beginning with the date of installation of the product.
B. Provide manufacturer's standard warranty for sheathing to be free of manufacturing defects that make it unsuitable for its intended use. Warranty period shall be Ten (10) years from the date of purchase of the product.
C. Provide manufacturer's standard warranty for use as a drainage plane when the cladding systems are properly designed and installed, with a warranty period of 10 years from the date of purchase of the product or, when used as a substrate in architecturally specified drainage EIFS, 12 years from the date of purchase of the product..

1.7 QUALITY ASSURANCE- PRECONSTRUCTION CONFRENCE
A. Conduct preconstruction conference onsite at project
B. Review air barrier products and installation requirements
C. Mock-up construction and expectations
D. Testing and inspection requirements
E. Sequencing and coordination of air barrier work with other materials and sections
Compatibility of materials that will interface with the primary fluid-applied membrane material and accessories

1.8 QUALITY ASSURANCE- Material

A. Air-Barrier Assembly Air Leakage: Maximum 0.04 cfm/sq. ft. of surface area at 1.57 lbf/sq. ft. (0.2 L/s x sq. m of surface area at 75 Pa), when tested according to ASTM E 2357.

1.9QUALITY ASSURANCE- MOCK UP

A. Install WRB / AB sheathing with sealed joints and penetrations in mock-up as specified in [Section 014339 Mock-Ups.] [Section _____].

1.10 QUALITY ASSURANCE – REGULATORY COMPLIANCE

A. Comply with US Environmental Protection Agency's AIM VOC regulations
B. Comply with 2015 ICC-ES AC 212 CIC ES Water-resistive Coatings Used as Water-resistive Barriers over Exterior Sheathing
C. Comply with 2018 and 2021 IRC requirements for continuous air barrier
D. Comply with 2018 and 2021 air barrier requirements of the IBC and IECC

1.11DELIVERY, STORAGE, AND HANDLING

A. Deliver and accept materials to the Project site in original packaging with seals unbroken and label with Manufacturer’s name.
B. Store INTERGRATED GYPSUM SHEATHING WATER-RESISTANT BARRIER AND AIR-BARRIER under cover and keep dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack sheathing flat and supported on risers on a flat platform to prevent sagging.
C.
D. Store fluid-applied and self-adhere material at temperatures of 40 degrees F or above.
E. Protect materials from damage, excessive temperatures, and construction traffic.
F. Handle materials in accordance with the manufacturer’s recommendation.
D.

1.12 FIELD CONDITIONS

A. Application standards where applicable are in accordance with Gypsum Association Publication GA-253 for gypsum sheathing and ASTM C1280.
B. Do not install sheathing that is moisture damaged. Indications that panels are moisture damaged include, but not limited to, discoloration, sagging, or irregular shape.
C. Allow installed sheathing to be dry to the touch before sealing joints, penetrations, rough openings, and material transitions.
D. Do not attempt to seal joints, corners, penetrations, rough openings, and material transitions when installed sheathing surface is frozen or has frost on the surface.

E. Do not apply sealing materials to sheathing when air or surface temperature is below 25F for fluid applied materials.
F. Sequencing. Do not install air barrier material before the roof assembly has been sufficiently installed to prevent a buildup of water in the interior of the building. Schedule other work requiring interface with the air barrier to ensure proper sequencing.
G. Compatibility. Do not allow air barrier materials to come in contact with chemically incompatible materials.
H. Ultra-violet exposure. Do not expose air barrier materials to sunlight longer than as recommended by the material manufacturer.

PART 2 PRODUCTS

2.1MANUFACTURERS

A. Basis-of-Designs: Provide Fiberglass-Mat Faced Gypsum Sheathing with Integrated Water-Resistive Barrier-Air Barrier (WRB-AB) - Georgia-Pacific Building Products LLC 1-800-225-6119; email: techservices@gapac.com" www.buildgp.com or comparable products approved by the Architect in agreement with Division 1 General Requirements.
B. Source Limitations: Obtain the primary air-barrier materials from a single source manufacturer.

2.2 Products

A. Fiberglass-Mat Faced Gypsum Sheathing with Integrated Water-Resistive Barrier Air Barrier (WRB-AB) : ASTM C1177/C1177M, Type X, fiberglass mat gypsum sheathing with integral water-resistant barrier and air barrier complying with ASTM E2178 and ICC-ES AC 212.
    1. DensElement Barrier System - Consisting of DensElement Sheathing which is a 5/8-inch-thick Fiberglass-Mat faced gypsum sheathing with Integrated Water-Resistive Barrier Air Barrier (WRB-AB), components, and accessories to maintain a Vapor-Permeable continuous Water-Restive Barrier and Air Barrier (WRB-AB) System.
    2. Air Barrier Accessory Materials
        A. Fluid applied flashing for seams, joints, inside and outside corners, material transitions, board to board seams, wall to slab, and penetrations
            a) DensDefy™ Liquid Flashing - a waterproofing and detailing compound made with STP Technology
        B. Self-Adhering transition membrane for flashing of rough openings, material transitions, and wall to slab
            a) DensDefy™ Transition Membrane - a waterproofing and detailing compound made with STP Technology
        C. Fluid-Applied Water-Resistive Barrier and Air Barrier Membrane for treatment of sheathing, CMU, and Concrete surfaces.

DensDefy™ Liquid Barrier - single component Silyl-Terminated Polymer (STP) air and water-resistive barrier applied by roller or with spray equipment applied at a minimum of 14 wet mils

2.3 PERFORMANCE

A. Fiberglass-Mat faced gypsum sheathing with Integrated Water-Resistive Barrier Air Barrier (WRB-AB)
   1. Size 48 by 96 (should we add other sizes) inches (1219 by 2438 mm) for vertical and horizontal installation.
   2. Edges: Square
   3. Air Permeance: Maximum 0.004 cfm/sq. ft. (0.2 L/s x sq. m) pressure difference when tested in accordance with ASTM E2178.
   4. Vapor Permeance: Minimum [25 perms (1436 ng/Pa x s x sq. m)] [30 perms (1724 ng/Pa x s x sq. m)] when tested in accordance with ASTM E96/E96M, Water Method, Procedure B.

A. Substrate requirements:
   1. Sheathing panels should be trimmed to obtain neat fitting joints.
   2. Gaps that are more than 1/4” and less than 1” shall be filled with a backer rod to support the fluid applied flashing at the transition joint.
   3. For gaps larger than 1" use transition membrane flashing as approved by Georgia-Pacific Gypsum LLC.

B. Fluid applied flashing for panel joints, inside and outside corners, and penetrations
   1. Description: STP-based fluid applied flashing.
   2. Properties:
      a. Acceptable substrate: Georgia-Pacific Gypsum LLC DensElement Sheathing.
      b. Adhesion to fiberglass mat faced sheathing: No delamination from face of sheathing.
      c. Applied wet film thickness: 16 mils.
      d. Air permeance: meets 0.004 cubic feet per minute per square foot (0.02L/s/sq m), maximum, when tested in accordance with ASTM E2178.
      e. Water vapor permeance: >10 perms (287 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M.
      f. Ultraviolet and weathering resistance: Approved for 12 months weather exposure.
      g. Comply with applicable requirements of AAMA 714
   3. Primer: Provide primer in accordance with air barrier manufacturer's written instructions for exposed gypsum core edges.

C. Fluid applied flashing for sealing fasteners:
   1. Description: STP-based fluid applied flashing.
   2. Properties:
      a. Acceptable substrate: Georgia-Pacific Gypsum LLC DensElement Sheathing.

b. Adhesion to fiberglass mat faced sheathing: No delamination from face of sheathing.
c. Applied wet film thickness: 16 mils.
d. Air permeance: meets 0.004 cubic feet per minute per square foot (0.02 L/s/sq m), maximum, when tested in accordance with ASTM E2178.
e. Water vapor permeance: >10 perms (287 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M.
f. Ultraviolet and weathering resistance: Approved for 12 months weather exposure.
g. Comply with applicable requirements of AAMA 714.

D. Fluid applied flashing for sealing rough openings
1. Fluid applied flashing: STP-based fluid applied flashing.
2. Primer: Liquid primer in accordance with air barrier manufacturer's written instructions for exposed gypsum core edges. Apply primer to raw gypsum board edges by brushing on a thin, uniform coat.
3. Properties:
a. Acceptable substrate: Georgia-Pacific Gypsum LLC DensElement Sheathing.
b. Flashing adhesion to fiberglass mat faced sheathing: No delamination from face of sheathing.
c. Applied wet film thickness: 16 mils.
d. Flashing air permeance: meets 0.004 cubic feet per minute per square foot (0.02 L/s/sq m), maximum, when tested in accordance with ASTM E2178.
e. Flashing water vapor permeance: >10 perms (287 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M.
f. Ultraviolet and weathering resistance: Approved for 12 months weather exposure.
g. Flashing comply with applicable requirements of AAMA 714.

E. Material transitions using fluid applied flashing:
1. Refer to substrate requirements for treatment of gaps as specified herein. Gaps that are more than 1/4” and less than 1” shall be filled with a backer rod to support the fluid applied flashing at the transition joint. For gaps larger than 1" use transition membrane flashing as approved by Georgia-Pacific Gypsum LLC
2. Fluid applied flashing for material transitions:
3. Properties:
a. Acceptable substrate: Georgia-Pacific Gypsum LLC DensElement Sheathing.
b. Adhesion to fiberglass mat faced sheathing: No delamination from face of sheathing.
c. Applied wet film thickness: 16 mils

d. Air permeance: 0.004 cubic feet per minute per square foot (0.02L/s/sq m), maximum, when tested in accordance with ASTM E2178
e. Water vapor permeance: >10 perms (287 ng/(Pa s sq m)), minimum, when tested in accordance with ASTM E96/E96M
f. Ultraviolet and weathering resistance: Approved for 12 months weather exposure
g. Comply with applicable requirements of AAMA 714

PART 3 EXECUTION

3.1 PREPARATION

A. Remove projections, protruding fasteners, loose or damaged sheathing material at edges of panel that might interfere with proper installation to seal joints, corners, fasteners, penetrations, openings, or material transitions.
B. Wipe down the sheathing surface to receive sealing materials with a clean cloth.
C. Ensure field conditions are met as outlined in Part 1 – General Requirements.

3.2 INSTALLATION OF WEATHER-RESISTANT BARRIER (WRB) AND AIR BARRIER (AB) SHEATHING

A. WRB / AB Coated fiberglass mat sheathing:
   1. Install and fasten DensElement Sheathing according to manufacturer's detailed installation instructions
   2. Fastener and penetration treatment: Treat all sheathing fasteners with specified fluid applied flashing used for sealing joints.

3.3 FLUID APPLIED FLASHING FOR SEALING SHEATHING JOINTS, INSIDE AND OUTSIDE CORNERS, FASTENERS, ROUGH OPENINGS, AND MATERIAL TRANSITIONS

A. Sealing DensElement Sheathing Joints using specified Fluid Applied Flashing
   1. Apply fluid applied flashing over the joint in a zigzag or ribbon pattern. Cover a minimum of 1" on both sides of the joint.
   2. With a straight edge tool, spread evenly over the sheathing joint.
   3. Apply at a rate to achieve a minimum wet mil thickness of 16 mils over the entire joint area.
B. Sealing DensElement Sheathing Vertical Corners using specified Fluid Applied Flashing
   1. Apply fluid applied flashing over the inside and/or outside corner in a zigzag or ribbon pattern. Cover a minimum of 2" on both sides of the corner.
   2. With a straight edge tool, spread evenly over the sheathing corner.
   3. Apply at a rate to achieve a minimum wet mil thickness of 16 mils over the corner area.

C. Sealing DensElement Sheathing Fasteners using specified Fluid Applied Flashing: Apply the fluid applied flashing material to fasteners and wipe down with a straight edge tool; provide a minimum 16 mil thick coating over the fastener.
D. Sealing DensElement Sheathing Rough Openings using specified Fluid Applied Flashing
    1. Apply a bead of DensDefy™ Liquid Flashing into all inside corners of the opening.
    2. Apply DensDefy™ Liquid Flashing in the opening sill, jamb and header in a zig-zag or ribbon pattern.
    3. Apply DensDefy™ Liquid Flashing over the DensElement Sheathing adjacent to the opening sill, jamb and header in a zig-zag or ribbon pattern.
    4. Use a straight edge tool to spread the DensDefy™ Liquid Flashing to a pinhole void free application achieving a minimum 16 wet mils
    5. Spread the DensDefy™ Liquid Flashing a minimum of 2” into the rough opening and a minimum 1” past the interior air seal of the window unit. Refer to the project details and specifications to determine window placement and minimum requirement for rough opening treatment.
    6. Ensure a minimum 2” of DensDefy™ Liquid Flashing is applied onto the sheathing surface adjacent to the opening.
E. Sealing DensElement sheathing material transitions using specified Fluid Applied Flashing
    1. Sheathing joint and transition gaps to receive fluid-applied flashing shall be less than 1/4" (6.4 mm).
    2. For gaps larger than 1/4" use shall be sealed with fluid-applied flashing as approved by Georgia-Pacific Gypsum, LLC
    3. Gaps that are more than 1/4” and less than 1” shall be filled with a backer rod to support the fluid applied flashing at the transition joint.
    4. If necessary, prime the adjacent material with primer per the material manufacturer’s recommendations.
    5. Apply fluid applied flashing over the sheathing and adjacent material in a zigzag or ribbon pattern. Ensure the flashing is a minimum of 2” on each substrate material surface.
    6. With a straight edge tool, spread fluid applied flashing over material transition joint.
    7. Apply at a rate to achieve a minimum wet mil thickness of 16 mils.

3.4 SEALING EXTERIOR WALL PENETRATIONS

A. Exterior wall penetration shall be sealed to prevent air and water infiltration. Penetrations may be sealed with fluid applied flashing.
B. For round or square pipe/duct penetrations use specified fluid applied flashing, refer to DensElement Barrier System Technical Guide for instructions for proper sealing.

3.5 FIELD QUALITY CONTROL

A. Do not cover installed WRB / AB assembly until required inspections have been completed and installation has been accepted.
B. Where applicable, allow for owner's inspection and air barrier testing and reporting.

3.6 PROTECTION

A. Protect WRB / AB assembly from damage during installation and during the construction period.

END OF SECTION

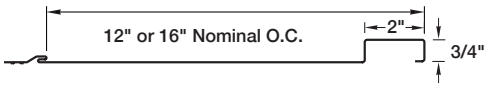
Board and Batten

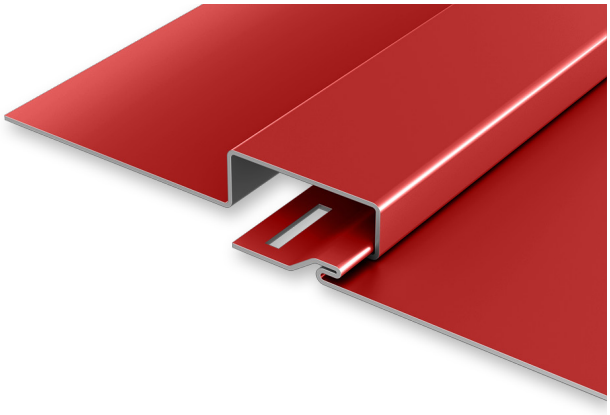
MATERIALS

.032 aluminum 24 gauge steel

SPECS

12" or 16" Wide* 3/4" High





WHERE TIMELESS DESIGN MEETS MODERN ELEGANCE

The Board and Batten panel system provides a timeless design aesthetic for commercial and residential wall applications. It uses a concealed fastener system to maintain clean lines and a rhythmic pattern of alternating wide vertical boards and narrower elevated battens. The ¾" batten depth and 2" width create dimensional interest while keeping trim offsets to a minimum. Board and Batten panels blend smoothly into various architectural styles. Whether creating a cozy and inviting facade or a bold and striking statement, Board and Batten exterior wall panels remain a versatile tool for architectural creativity.

*widths are nominal

FEATURES

- Installs with concealed mechanical fasteners through pre-punched holes
- Vertical wall applications only
- Widths - 12", 16"*
- Batten is 2" wide and ¾" deep on all panel widthsMaximum length for steel is 30 feet
- Maximum length for aluminum is 22 feet

TESTING

- ASTM E283
- ASTM E331
- AAMA 501.1
- ASTM E330
- TAS 202
- TAS 203

PAC-CLAD A CARLISLE COMPANY

PAC-CLAD® is a registered trademark of Petersen Aluminum Corporation. The PAC-CLAD finish is 70% polyvinylidene fluoride (PVDF). 6/26

GUIDE SPECIFICATION

Tite-Loc Aluminum

August 2024

SECTION 07410- PREFORMED METAL STANDING SEAM ROOFING

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. This section covers the pre-finished, pre-fabricated Architectural standing seam roof system. All metal trim, accessories, fasteners, insulation and sealants indicated on the drawings as part of this section.
B. Drawings and general provisions of the Contract, including general and Supplementary Conditions and Division 01 Specifications, apply to this section.
C. Related Work Specified Elsewhere
    1. Roof Deck structural steel, flat roof systems, perimeter edge systems. Roof hatches, firestopping not included in this section.

1.2 SUMMARY

A. Section Includes
    1. Factory formed Standing Seam metal roof panels
B. Related work specified elsewhere. (Note: select from the below or add appropriate sections)
    1. Section 05100 - Structural Steel
    2. Section 05200 or 05400 - Steel Joists
    3. Section 07600 - Flashing and Sheet Metal

1.3 DEFINITIONS

A. Metal Roof Panel Assembly**:** Metal roof panels, attachment system components, miscellaneous metal framing, thermal, and accessories necessary for a complete weathertight roofing system.
B. References:
    1. American Society for Testing and Materials (ASTM)
        a. ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
    2. Sheet Metal and Air Conditioning Contractors National Association (SMACNA)
        a. SMACNA Architectural Sheet Metal Manual, 1993 edition
    3. American Iron and Steel Institute (AISI)
        a. AISI Cold Formed Steel Design Manual
    4. Aluminum Association
        a. Aluminum Design Manual
    5. Metal Construction Association
        a. Preformed metal Wall Guidelines
    6. Code References
        a. ASCE, Minimum Loads for Buildings and Other Structures
        b. BOCA National Building Codes
        c. UBC Uniform Building Code
        d. SBC Standard Building Code

1.4 QUALITY ASSURANCE

A. Petersen Aluminum Corporation products establish a minimum of quality required. Specifier: Choose location:
   1. Petersen Aluminum Corp, Elk Grove Village, IL, 800-323-1960
   2. Petersen Aluminum Corp, Annapolis Junction, MD, 800-344-1400
   3. Petersen Aluminum Corp, Tyler, TX, 800-441-8661
   4. Petersen Aluminum Corp, Acworth, GA, 800-272-4482

B. Manufacturer and erector shall demonstrate experience of a minimum of five (5) years in this type of project.

C. Panels shall be factory-produced only. No portable, installer-owned or installer-rented machines will be permitted.

1.5 SUBSTITUTIONS

A. The material, products and equipment specified in this section establish a standard for required function, dimension, appearance and quality to be met by any proposed substitution.

1.6 SYSTEM DESCRIPTION

A. Material to comply with ASTM B209 Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

1.7 ROOF SYSTEM PERFORMANCE TESTING

A. General Performance: Metal roof panels shall comply with performance requirements without failure due to defective manufacture, fabrication, installation or other defects in construction.

B. Roof System shall be designed to meet Standard Building Code Wind Load requirements.

C. Panels to meet:
   1. Water Penetration: When tested per ASTM E-283/1680 and ASTM E-331/1646 there shall be no uncontrolled water penetration or air infiltration through the panel joints.
   2. Roof System shall be designed to meet a UL Class 90 wind uplift in accordance with UL standard 580 and panel system shall be ASTM 1592 Tested and approved
   3. UL 2218 – Impact Resistance rated.

1.8 WARRANTIES

A. Weathertight warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.

B. Warranty Period: 20 Years from date of Substantial Completion

C. Finish warranty: Manufacturer's standard form in which manufacturer agrees to repair finish or replace standing seam metal roof panels that show evidence of deterioration of factory-applied finish within specified warranty period.
   1. Exposed Panels Finish – deterioration includes 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 a paint to adhere to a bare metal.
   2. Warranty Period: 30 Years from the date of substantial completion

D. Applicator shall furnish written warranty for a two (2) year period from date of substantial completion of building covering repairs required to maintain roof and flashings in watertight condition

1.9 SUBMITTALS

A. Furnish detailed drawings showing profile and gauge of exterior sheets, location and type of fasteners, location, gauges, shape and method of attachment of all trim locations and types of sealants, and any other details as may be required for a weather-tight installation.

B. Provide finish samples of all colors specified.

C. Shop drawings: Show fabrication and installation layouts of metal roof panels, metal wall panels or metal soffit panels, details of edge conditions, side-seam joints, panel profiles,

corners, anchorages, trim, flashings, closures and accessories, and special details. Distinguish between factory and field-assembled work

D. Coordination Drawings: Roof plans, drawn to scale, on which the following are shown and coordinated with each other, base don input from installer of the items involved:
   1. Roof panels and attachments
   2. Metal trusses, bracings and supports
   3. Roof-mounted items including snow guards and items mounted on roof curbs.
E. LEED Submittals
   1. Product Test reports for Credit SS 7.2. For roof panels, indicating that the panels comply with Solar Reflective Index requirement
   2. Product data for Credit MR 4.1 and credit MR 4.2: Indicating the percentages by weight of postconsumer and preconsumer recycled content for products having recycled content.

1.10 DELIVERY, STORAGE AND HANDLING

A. Ordering: Comply with manufacturer's ordering instruction and lead time requirements to avoid construction delays.
B. Deliver components, sheets, metal roof panels and other manufactured items so as not to be damaged or deformed. Package metal roof panels for protection during transportation and handling.
C. Unload, store and erect metal roof panels in a manner to prevent bending, warping, twisting and surface damage.
D. Stack metal roof panels on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal roof panels to ensure dryness. Do not store metal roof panels in contact with other materials that might cause staining, denting or other surface damage.
E. Protect strippable protective coating on any metal coated product from exposure to sunlight and high humidity, except to the extent necessary for material installation.

1.11 PROJECT CONDITIONS

A. Weather Limitations: proceed with installation only when existing and forecasted weather conditions permit metal roof panel work to be performed.
B. Field Measurements: Verify actual dimensions of construction contiguous with metal roof panels by field measurements before fabrication.

1.12 COORDINATION

A. Coordinate sizes and locations of roof curbs, equipment supports and roof penetrations with actual equipment provided.
B. Coordinate metal roof panels with rain drainage work, flashing, trim and construction of decks, parapet walls and other adjoining work to provide a leakproof, secure and noncorrosive installation.

PART 2 – PRODUCTS

2.1 PANEL DESIGN

A. General: Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type indicated and mechanically attaching panels to supports using concealed clips in side laps. Include clips, cleats, pressure plates and accessories required for a weathertight installation.
B. Roof panels shall be standing seam Tite Loc Plus, in {Specifier choose from) 18" 16" or 12" widths with 2" seams that are mechanically seamed together at 180 degrees.
C. Panels to be produced with Factory supplied hot melt mastic in the seams.
D. Panels to be produced:. Specifier note: Choose from panel conditions below:
   1. Smooth – Note this is factory standard if other not indicated
   2. With Striations
   3. With striations with pencil ribs (Acworth factory only)
E. Panels to be designed for attachment with concealed fastener clips, spaced as required by the manufacturer to provide for both positive and negative design loads, while allowing for the

expansion and contraction of the entire roof system resulting from variations in temperature.

F. Forming: Use continuous end rolling method. No end laps on panels. No portable rollforming machines will be permitted on this project, no installer-owned or installer-rented machines will be permitted. It is the intent of the Architect to provide Factory-Manufactured panel systems only for this project.

2.2 ACCEPTABLE MANUFACTURERS

A. This project is detailed around the Tite Loc Plus Panel of Petersen Aluminum Corporation.

2.3 MATERIALS AND FINISHES

A. Preformed roofing panels shall be fabricated of (Specifier Note – choose from) .032 thickness 3105-H14 aluminum or .040 thickness 3105-H14 aluminum.

B. Color shall be PAC-CLAD _____.(Specifier – choose finish from available colors shown by gauge on PAC color chart)

C. Finish shall be Kynar 500 or Hylar 5000 Fluorocarbon coating with a top side film thickness of 0.70 to 0.90 mil over a 0.25 to 0.3 mil prime coat to provide a total dry film thickness of 0.95 to 1.25 mil, to meet AAMA 621. Bottom side shall be coated with a primer with a dry film thickness of 0.25 mil. Finish shall conform to all tests for adhesions, flexibility and longevity as specified by Kynar 500 or Hylar 5000 finish supplier.

D. If Strippable coating to be applied on the pre-finished panels to the top side to protect the finish during fabrication, shipping and handling, film shall be removed before installation.

E. Trim: Trim shall be fabricated of the same material and finish to match the profile, and will be press broken in lengths of 10 to 12 feet. Trim shall be formed only by the manufacturer or their approved dealer. Trim to be erected in overlapped condition. Use lap strips only as indicated on drawings. Miter conditions shall be factory welded material to match the sheeting.

F. Closures: use composition or metal profiled closures at the top of each elevation to close ends of the panels. Metal closures to be made in the same material and finish as face sheet.

G. Accessories/Fasteners: Fasteners shall be of type, material, size, corrosion resistance, holding power and other properties required to fasten miscellaneous framing members to substrates. Accessories and their fasteners shall be capable of resisting the specified design wind uplift forces and shall allow for thermal movement of the roof panel system. Exposed fasteners shall not restrict free movement of the roof panel system resulting from thermal forces, except at designed points of roof panel fixity

H. Substrate shall be:(Specifier: choose from)
   1. Plywood
   2. ISO
   3. Nailbase

I. Roofing Underlayment
   1. On all surfaces to be covered with roofing material, furnish and install a 40 mil “Peel & Stick membrane”, required as outlined by metal panel manufacturer. Membrane to be a minimum of 40 mil thickness, smooth, non-granular, high temperature. **Basis of design**: Carlisle WIP 300 HT High Temperature Protection Self Adhering Roofing Underlayment. Other acceptable manufacturers include:
      a. W.R Grace “Ice & Water Shield”
      b. Interwrap Titanium PSU-30
      c. Tamko TW Tile and Metal Underlayment
   2. Underlayment shall be laid in horizontal layers with joints lapped toward the eaves a minimum of 6”, and well secured along laps and at ends as necessary to properly hold the felt in place. All underlayment shall be preserved unbroken and whole.
   3. Peel and Stick Underlayment shall lap all hips and ridges at least 12” to form double thickness and shall be lapped 6” over the metal of any valley or built-in gutters and shall be installed as required by the Standing Seam Panel Manufacturer to attain the desired 20 Year Weathertightness Warranty.

J. Sealants
   1. Provide two-part polysulfide class B non-sag type for vertical and horizontal joints or
   2. One part polysulfide not containing pitch or phenolic extenders or
   3. Exterior grade silicone sealant recommended by roofing manufacturer or
   4. One part non-sag, gun grade exterior type polyurethane recommended by the roofing

manufacturer.

2.4 FABRICATION

A. Comply with dimensions, profile limitations, gauges and fabrication details shown and if not shown, provide manufacturer's standard product fabrication.
B. Fabricate components of the system in factory, ready for field assembly.
C. Fabricate components and assemble units to comply with fire performance requirements specified.
D. Apply specified finishes in conformance with manufacturer's standard, and according to manufacturer's instructions.

PART 3 – EXECUTION

3.1 INSPECTION

A. Examine alignment of structural steel and related supports, primary and secondary roof framing, solid roof sheathing, prior to installation.
B. For the record, prepare written report, endorsed by installer, listing conditions detrimental to performance of the Work.
C. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 FASTENERS

A. Secure units to supports
B. Place fasteners as indicated in manufacturer's standards.

3.3 INSTALLATION

A. Panels shall be installed plumb and true in a proper alignment and in relation to the structural framing. The erector must have at least five years successful experience with similar applications.
B. Install metal panels, fasteners, trim and related sealants in accordance with approved shop drawings and as may be required for a weather-tight installation.
C. Remove all strippable coating and provide a dry-wipe down cleaning of the panels as they are erected.

3.4 DAMAGED MATERIAL

A. Upon determination of responsibility, repair or replace damaged metal panels and trim to the satisfaction of the Architect and Owner.

END OF SECTION

GUIDE SPECIFICATION

PAC-3000 CS/RS Composite

October 2019

SECTION 07420- ALUMINUM COMPOSITE MATERIAL BUILDING PANELS (PE)

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes
   1. The extent of panel system work is indicated on the drawings and in these specifications.
   2. Panel system requirements include the following components:
      a. Aluminum-faced composite panels with mounting system. Panel mounting system including anchorages, furring, fasteners, gaskets and sealants, related flashing adapters and masking for a complete installation.
      b. Panel manufacturer recommends that system should include shop-installed aluminum stiffeners on all panels of 20 square feet or larger. Minimum stiffener recommendation is one per 20 square feet of panel area.
      c. Parapet coping, column covers, soffits, sills, border and filler items may be indicated as integral components of the panels system or as designed.
      d. All flashing metal required shall be provided by the panel manufacturer.
      e. System to be fabricated and installed per local code requirements.

B. Related Documents
   1. Drawings and general provisions of the contract, including general and supplementary conditions, division 1 specification sections and technical specification divisions 2 through 16, apply to this section.

C. Related Work Specified Elsewhere
   1. Section 05100: Structural steel
   2. Section 06100: Backup walls
   3. Section 07200: Insulation
   4. Section 07600: Metal flashing, counter flashing and parapet coping
   5. Section 07920: Caulking and sealants
   6. Section 09200: Interior wall finishes

1.2 PERFORMANCE REQUIREMENTS

A. Structural performance: provide exterior/interior wall cladding assemblies capable of withstanding the effects of load and stresses from dead loads, wind loads, snow loads and normal thermal movement without evidence of permanent defects of assemblies or components.
   1. Dead load: As required by applicable building code.
   2. Live Load: As required by applicable building code.
   3. Wind Load: Uniform pressure [velocity pressure] of [Insert Design Criteria] lb/sq ft. [Insert Design Criteria], acting inward or outward.
   4. Thermal Movements: Provide assemblies that allow for thermal movements resulting from the following maximum changes (range) in ambient and surface temperatures by preventing buckling, opening of joints, overstressing of components and other detrimental effects:
      a. Temperature Change (range): 120 deg F (67 deg C), ambient; 180 deg F

(100 deg C), material surfaces.

B. Sealed joints shall allow free and silent movement of panels during expansion and contraction while preventing uncontrolled penetration of moisture.
C. Manufacturing, installation, and sealing shall prevent deformation of exposed surfaces.
D. Design panel system to accommodate substructure tolerance of +0 to -1/8 inch.
E. Design the system to affect a positive mechanically fastened assembly to substructure, not dependent on adhesives.
F. Not Permitted: Vibration harmonics; wind whistles; noises caused by thermal movement; thermal movement transmitted to other building elements; loosening, weakening or fracturing of attachments or components of system.
G. Structural Performance / Uniform Load Deflection Test: Provide panel system that has been tested in accordance with ASTM E330 at a design pressure of 60 psf without deformation or failures of structural members. Maximum allowable deflection of span: L/60.
H. Air Infiltration: Panel system shall not have air infiltration rate more than 0.06 cfm per sq. ft. of fixed wall area when tested in accordance with ASTM E283 at static air pressure differential of 1.57 psf.
I. Static Water Penetration: Panel system shall have no water penetration as defined by in test method when tested in accordance with ASTM E331 at inward static pressure differential of not less than 6.24 psf and not more than 12.0 psf.
J. Dynamic Water Penetration: Panel system shall have been tested in accordance with AAMA 501 and shall have passed with no uncontrolled water leakage at 10.00 psf dynamic pressure differential, with water application rate of 5 gallons/hr/sqft.

1.3 QUALITY ASSURANCE

A. Composite panel manufacturer shall have a minimum of 5 years' architectural experience in the manufacture of this product and be located within the continental USA.
B. It is recommended that fabrication and installation of composite panels shall be from a single source. If not single source, both panel fabricator and the installer must show proof of past successful collaboration.
C. Installer shall be acceptable to composite panel manufacturer.
D. Installer shall have a minimum 5 years' experience in architectural metal panel work similar in scope and size to this project.
E. Coordinate fabrication schedule with construction progress as directed by the contractor to avoid delay of work.
F. Shop drawings shall show the preferred joint details providing a watertight and structurally sound wall panel system that allows no uncontrolled water penetration, on the inside face of the panel system as determined by ASTM E331.
G. Maximum deviation from vertical and horizontal alignment of erected panels: 6 mm (1/4") in 6 m (20') non-accumulative.
H. Panel fabricator and installer shall assume undivided responsibility for all components of the exterior panel system, including but not limited to, attachment to sub-construction, panel-to-panel joinery, panel-to-dissimilar-material joinery and joint seal associated with the panel system.

1.4 REFERENCES

A. American Society for Testing and Materials
    1. E330: Structural Performance of Exterior Windows, Curtain Walls and Doors under the Influence of Wind Loads.
    2. E283: Rate of Leakage Through Exterior Windows, Curtain Walls and Doors.
    3. D1781: Climbing Drum Peel Test for Adhesive Materials.
    4. E84: Surface-Burning Characteristics of Building Materials.
    5. E283: Air Performance of Exterior Windows, Curtain Walls and Doors.
    6. D3363: Method for Film Hardness by Pencil Test.
    7. D2794: Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact).
    8. D3359: Methods for Measuring Adhesion by Tape Test.
    9. D2247: Practice for Testing Water Resistance of Coatings in 100% Relative Humidity.
    10. B117: Method of Salt Spray (Fog) Testing.
    11. D822: Practice for Operating Light and Water Exposure Apparatus (Carbon-Arc

Type) for Testing Paint, Varnish, Lacquer and Related Products.
12. D1308: Effect of Household Chemicals on Clear and Pigmented Organic Finishes.
13. D1735: Method for Water Fog Testing of Organic Coatings.
14. D1929: Standard Test Method for Determining Ignition Temperature of Plastics.
15. D635: Standard Test Method for Rate of Burning and/or Extent and Time of Burning of Plastics in Horizontal Position.

B. American Architectural Manufacturers Association
1. AAMA-620

1.5 SUBMITTALS

A. Submittals shall be in conformance with section_____.
B. Samples
1. Panel assembly: Two samples of each type of assembly, 304 mm (12”) x 304 mm (12”) minimum.
2. Two samples of each color or finish selected, 76 mm (3") x 102 mm (4") minimum.
3. Custom-color samples will contain drawdown lines. Sizes for custom-color samples are limited.
C. Shop Drawings: Submit shop drawings showing project layout and elevations; fastening and anchoring methods; detail and location of joints, sealants and gaskets, including joints necessary to accommodate thermal movement; trim; flashing; and accessories.
D. Manufacturer’s literature shall certify that material meets specifications.
E. Submit fabrication drawings showing location and type of aluminum-extruded stiffeners at typical panels and at corner panels, if required.
F. Documents showing product compliance with the local building code shall be submitted prior to the bid. These documents may include evaluation reports, test reports, supporting document and drawings, and manufacturer’s data. The architect must approve alternate material prior to bid date.

1.6 DELIVERY, STORAGE & HANDLING

A. General: Comply with Division 1 Product Requirements Sections.
B. Ordering: Comply with manufacturer’s ordering instructions, and lead-time requirements to avoid construction delays.
C. Delivery: Deliver materials in manufacturer’s original, unopened, undamaged containers with identification labels intact.
1. Store materials in accordance with manufacturer’s recommendations.
2. Handle materials carefully to avoid damage to materials and finishes.

1.7 PROJECT CONDITIONS

A. Field Measurements: Verify actual supporting and adjoining construction by field measurements before fabrication, and indicate recorded measurements on final shop drawings. Coordinate construction to ensure that wall panel assemblies fit properly to supporting and adjoining construction and coordinate schedule with construction progress to avoid delaying the work.
1. Established dimensions: where field measurements can not be made without delaying the work, guarantee dimensions and proceed with fabrication of wall panel assemblies corresponding to the established dimensions.

1.8 WARRANTY

A. The installer will warrant the wall system for a period of 1 year that the fabrication and installation workmanship will be free from defects.
B. The aluminum composite material manufacturer shall warrant for a period of 20 years against Max 5 fade based on ASTM D2244 and Max 8 chalk based on ASTM D4212 and delamination of the paint finish.

PART 2 – Products

2.1 MANUFACTURER

A. Manufacturers: Subject to compliance requirements, provide products manufactured by:

1. Petersen Aluminum Corporation, 1005 Tonne Road, Elk Grove Village, IL 60007. Phone – 800-722-7440, Fax: 800-722-7150, www.pac-clad.com
    a. PAC 3000 CS Caulk Joint Composite Wall Panel System
    b. PAC 3000 RS Rain Screen (Dry System) Composite Wall Panel System
    c. Alternate systems by other manufacturers/fabricators are to be submitted to the architect not less than 7 working days prior to bid.

2.2 MATERIALS

A. Composite Panels
    1. Panels shall be Reynobond® Aluminum Composite Material (ACM) as manufactured by Alcoa Architectural Products, Other manufacturers are acceptable as long as they meet the same criteria as Reynobond in thickness, panel weight, bond integrity, fire rating, paint color and finish. ACM must be manufactured in the USA.
    2. Standard Fire rated Core (FR)
    3. Panel Thickness: RB160FR (4 mm) = 0.157"
    4. Panel Weight: RB160FR (4 mm) = 1.53 lbs/sft
B. Product Performance
    1. Bond integrity: When tested for bond integrity, in accordance with ASTM D1781 (simulating resistance to panel delamination), there shall not be an adhesive failure of the bond a) between the core and the skin or b) cohesive failure of the core itself below the following values.
    2. Peel Strength: 178 N mm/mm (40 in lb./in.) as manufactured; 178 N mm/mm (40 in lb./in.) After 21 days soaking in water at 70°F
    3. Fire Performance: ASTM E84 – Passed Class A; NFPA 285 - Passed
C. Panel Finishes
    1. Coil-coated Kynar 500® or Hylar 5000® based polyvinylidene fluoride (PVDF). Alcoa Architectural Products shall be Colorweld® 300 a fluoropolymer coating utilizing 70% Kynar 500® resins.
        a. Color: To be chosen from Alcoa Architectural Products, Reynobond® standard series one, two or three colors.
        b. Coating: Shall be factory applied on a continuous-process paint line. Coating shall consist of a 0.2 mil (approx.) prime coat and a 0.8 mil (approx.) finish coat containing 70% Kynar 500® resins. (If Colorweld® 300XL, coating shall consist of a 0.2 mil (approx.) barrier prime coat, a 0.80 mil (approx.) color coat, containing 70% Kynar 500® resins and a 0.5 mil (approx.) clear coat containing 70% Kynar 500® resins.) Nominal dry film thickness is 1.50 mils.
        c. Specular Gloss: ASTM D523 standard at 60º shall be 15-35, Mica; 25–35 Metallic.
        d. Pencil hardness: ASTM D3363 shall be F-2H minimum.
        e. Flexibility T-Bend: ASTM D4145 shall be 1T to 2T-Bend; no pick-off.
        f. Adhesion: ASTM D3359 reverse impact 1/16" crosshatch shall show no cracking or adhesion loss.
        g. Reverse Impact: ASTM D2794 - Passes.
        h. Salt Spray Resistance: ASTM B117, 5% salt fog at 95°F. Pass 4,000 hrs. less than 1/16" average creep from scribe; up to a few #8 blisters.
        i. Humidity Resistance: ASTM ASTM D2247 100% relative humidity at 95ºF, shall pass 4,000 hrs., # 8 blisters.
        j. Exterior Exposure: 10 years at 45º, South Florida. ASTM D2244 shall be 10 years, Max. 5 fade; and ASTM D4214 shall be Max. 8 chalk.
        k. Paint system shall meet the requirements of AAMA 620 specifications. Megaflon®, Coraflon® or any Lumiflon®-based paint systems are not acceptable.
        l. Paint system shall have more than 20 years of architectural field use.

2.3 PANEL FABRICATION

A. ACM is comprised of two sheets of aluminum sandwiching a solid core of extruded thermoplastic material formed in a continuous process using no glues or adhesives between

dissimilar materials. The core shall be free of voids and/or air spaces and not contain foamed insulation materials. The bond between the core and the skins shall be a chemical bond. Products laminated sheet by sheet in a batch process using glues or adhesives between materials shall not be acceptable.

B. Aluminum Face Sheets
    1. Thickness: 0.020"
    2. Aluminum alloy shall be 3000 series or equivalent.
C. Tolerances
    1. Panel Bow: Shall not exceed 0.8% of panel overall dimension in width or length.
    2. Panel Dimensions: Field fabrication shall be allowed where necessary, but shall be kept to an absolute minimum. All fabrication shall be done under controlled shop conditions when possible. Panel dimensions shall be such that there will be an allowance for field adjustment and thermal movement.
    3. Panel Lines: Breaks and curves shall be sharp and true, and surfaces free of warps or buckles.
    4. Flatness: Panels shall be visually flat.
    5. Panel Surfaces: Shall be free of scratches or marks caused during fabrication.
D. System Characteristics
    1. Plans, elevations, details, characteristics and other requirements indicated are based upon standards by one manufacturer. It is intended that other manufacturers, receiving prior approval, may be acceptable, provided their details and characteristics comply with size and profile requirements, and material/performance standards.
    2. System must not generally have any visible fasteners, telegraphing or fastening on the panel faces or any other compromise of a neat and flat appearance.
    3. Fabricate panel system to dimension, size and profile indicated on the drawings based on a design temperature of 68ºF (20ºC).
    4. Fabricate panel system to avoid compressive skin stresses. The installation detailing shall be such that the panels remain flat regardless of temperature changes and at all times remain air- and watertight.
    5. The finish side of the panel shall have a removable protective film applied prior to fabrication, which shall remain on the panel during fabrication, shipping and erection to protect the surface from damage.
E. System Type (select from the following)
    1. PAC 3000CS - Rout-and-Return Wet System, engineered system including clips, trim, and flashings.
    2. PAC 3000RS - Rout-and-Return Dry System, engineered system including extruded perimeter frame, all extrusions, clips, trim and flashings.
F. System Performance
    1. Composite panels shall be capable of withstanding building movements and weather exposures based on the following test standards required by the architect and/or local building codes:
        a. Wind Load – If system tests are not available, under the direction of an independent third-party laboratory, mockups shall be constructed and tests performed to show compliance to the following minimum standards:
            1) Panels shall be designed to withstand the design wind load based upon the local building code, but in no case less than 20 pounds per square foot (psf) and 30 psf on parapet and corner panels. Wind-load testing shall be conducted in accordance with ASTM E330 to obtain the following results.
            2) Normal to the plane of the wall between supports, deflection of the secured perimeter-framing members shall not exceed L/175 or 3/4", whichever is less.
            3) Normal to the plane of the wall, the maximum panel deflection shall not exceed L/60 of the full span.
            4) Maximum anchor deflection shall not exceed 1/16". At 1 1/2 times design pressure, permanent deflections of framing members shall not exceed l/100 of span length and components shall not experience failure or gross permanent distortion. At connection points of framing members to anchors, permanent set shall not exceed 1/16".

b. Air/Water System Test – Without backup waterproof membrane. If system tests are not available, under the direction of an independent third-party laboratory, mockups shall be constructed and tests performed to show compliance to the following minimum standards:
    1) Air Infiltration – When tested in accordance with ASTM E283, air infiltration at 1.57 psf must not exceed 0.06 cubic feet per minute per square foot of wall area.
    2) Water Infiltration – Water infiltration is defined as uncontrolled water leakage through the exterior face of the assembly. Systems not using a construction sealant at the panel joints (i.e., Dry Systems) shall be designed to drain any water leakage occurring at the joints. No water infiltration shall occur in any system under a differential static pressure of 6.24 psf after 15 minutes of exposure in accordance with ASTM E331.

2.4 ACCESSORIES

A. Extrusions, formed members, sheet and plate shall conform with ASTM B209 and the recommendations of the manufacturer.
B. Panel stiffeners, if required, shall be structurally fastened or restrained at the ends and shall be secured to the rear face of the composite panel with silicone of sufficient size and strength to maintain panel flatness. Stiffener material and/or finish shall be compatible with the silicone.
C. Sealants and gaskets within the panel system shall be as per manufacturer's standards to meet performance requirements.
D. Fabricate flashing materials from 0.040" minimum thickness aluminum sheet or as recommended by panel manufacturer to match the adjacent curtain wall/panel system where exposed. Post-painted spray-applied flashings are not acceptable. Provide a lap strap under the flashing at abutted conditions and seal lapped surfaces with a full bead of non-hardening sealant.
E. Fasteners (concealed/non-corrosive): Fasteners as recommended by system manufacturer.

PART 3 – Execution

3.1 INSPECTION

A. Surfaces to receive panels shall be even, smooth, sound, clean, dry and free from defects detrimental to work. Notify contractor in writing of conditions detrimental to proper and timely completion of the work. Do not proceed with erection until unsatisfactory conditions have been corrected.
B. Surfaces to receive panels shall be structurally sound as determined by a registered engineer. In no case shall metal structural supports be less than 18 gauge.

3.2 INSTALLATION

A. Erect panels plumb and level.
B. Attachment system shall allow for the free vertical and horizontal thermal movement due to expansion and contraction for a material temperature range of -20ºF (-29ºC) to +180ºF (+82ºC). Buckling of panels, opening of joints, undue stress on fasteners, failure of sealants or any other detrimental effects due to thermal movement are not permitted. Fabrication, assembly and erection procedure shall account for the ambient temperature at the time of the respective operation.
C. Panels shall be erected in accordance with an approved set of shop drawings.
D. Anchor panels securely per engineering recommendations and in accordance with approved shop drawings to allow for necessary thermal movement and structural support.
E. Conform to panel fabricator's instructions for installation of concealed fasteners.
F. Do not install component parts that are observed to be defective, including warped, bowed, dented, scraped and broken members.
G. Do not cut, trim, weld or scrape component parts during erection in a manner that would damage the finish, decrease strength or result in a visual imperfection or a failure in performance. Return component parts that require alteration to shop for re-fabrication, or for

replacement with new parts.

H. Separate dissimilar metals; use appropriate gaskets and fasteners to minimize corrosive or electrolytic action between metals.

3.3 ADJUSTING AND CLEANING

A. Remove and replace panels damaged beyond repair as a direct result of panel installation. After installation, panel repair and replacement shall become the responsibility of the general contractor.
B. Repair panels with minor damage.
C. Remove masking film (if used) as soon as possible after installation. Masking intentionally left in place after panel installation on an elevation shall become the responsibility of the general contractor.
D. Any additional protection, after installation, shall be the responsibility of the general contractor to remove.
E. Make sure weep holes and drainage channels are unobstructed and free of dirt and sealants.
F. Final cleaning shall not be part of the work of this section.

END OF SECTION

GUIDE SPECIFICATION

Corr-Lok, Design-Lok, Max-Lok, Mesa-Lok, Mesa-Lok HSE, Shadow-Lok

October 2024

SECTION 07 42 13- INSULATED METAL WALL PANELS

PART 1 - GENERAL

1.1 Summary

A. The contract drawings indicate the extent and general details of the walls. This section includes requirements for the factory-formed, pre-insulated, metal, wall panel cladding system and the corresponding metal flashings, sealants, fasteners, clips and other accessories.

1.2 Related Sections

A. Section 05 40 00 - Cold Formed Metal Framing
B. Section 06 10 00 - Rough Carpentry
C. Section 07 21 00 - Thermal Insulation
D. Section 07 25 00 - Weather Barriers
E. Section 07 27 00 - Air Barriers
F. Section 07 62 00 - Sheet Metal Flashing and Trim
G. Section 07 92 99 - Joint Sealants

1.3 References

A. AISC - Steel Construction Manual – 15th Edition
B. AISI - North American Specification for the Design of Cold-Formed Structural Members, 2016
C. ASCE 7 - Minimum Design Loads for Buildings and Other Structures
D. ASTM
    1. ASTM C 518-10 Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus
    2. ASTM C 1363-05 Standard Test Method for Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
    3. ASTM C 273-07 Standard Test Method for Shear Properties of Sandwich Core Materials
    4. ASTM D 1621-10 Standard Test Method for Compressive Properties of Rigid Cellular Plastics
    5. ASTM D 1623-09 Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
    6. ASTM D 1622-08 Standard Test Method for Apparent Density of Rigid Cellular Plastics
    7. ASTM D 6226-10 Standard Test Method for Open Cell Content of Rigid Cellular Plastics
    8. ASTM E 72-10 Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
    9. ASTM E 84-10b Standard Test Method of Surface Burning Characteristics of Building Materials
    10. ASTM E 283-04 Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences

Across the Specimen
11. ASTM E 331-00 Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
12. ASTM E 1592-05 Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference

E. FM Global
1. FM 4880 Approval Standard for Class 1 Fire Rating of Insulated Wall or Wall and Roof/Ceiling Panels, Interior Finish Materials or Coatings and Exterior Wall Systems
2. 4881 Approval Standard for Class 1 Exterior Wall Systems

F. International Building Code (IBC)

1.4 Submittals

A. Manufacturer's product literature. Include product data and installation instructions.
B. Manufacturer's written installation instructions: Provide manufacturer's written instructions to installer, marked to show component installation; Where instructions allow installation options, indicate option for use.
C. Shop drawings showing elevations, panel layout and calling out panel profile, thickness, gauge, width, finish and texture.
1. The drawings shall also illustrate product components including fasteners, clips, sealants, trims and any other necessary accessories.

D. Engineering package illustrating the panels will resist the code stipulated loads.
E. Color chip and/or chart.
F. Samples: 12" long sample of wall panel. Provide color ships for selection of color and sheen. Provide (2) 3" x 5" finish samples in color selected.
G. Installation instructions.
H. Sample warranties (substrate and finish).
I. Letter of Certification stating that all parts of this specification were satisfied.

1.5 Delivery, Storage and Handling

A. Deliver panels in the original manufacturer's weather-resistant, shrink-wrapped packaging with clearly marked, weather-resistant labeling.
B. Store the panels in a clean, level, protected and sufficiently compacted area. Provide ventilation if the bundles are exposed to moisture; further, elevate one end of the bundle to ensure adequate runoff. Do not stack more than two bundles high. Stack material to prevent twisting, bending, abrasion, scratching and denting.
C. Use proper care in unloading, storing and installing the wall panels. Handle panels in a fashion that will not bend, dent, scratch or otherwise damage the product.
D. Refer to the PAC-CLAD IMP Insulated Metal Panel Handling & Maintenance Guide for more specific information regarding handling, storage, strippable film, steel debris, corrosion, cleaning and field painting.

1.6 Project Conditions

A. Weather limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturer's written instructions and warranty requirements.

1.7 Warranty

A. The manufacturer warrants the panels as free of defects in material and workmanship for a period of (2) years from the date of production. This excludes the material coatings and finishes which are covered under separate warranties.
B. The manufacturer warrants the GALVALUME® substrate for a period of 20-years subject to the terms and conditions set forth in the manufacturer's GALVALUME® 20-Year Limited Warranty.
C. The manufacturer warrants the Kynar 500® coating system for a period of 25-years subject to the terms and conditions set forth in the manufacturer's Coating System Limited Warranty.
D. The installer warrants the panels as free of defects in material installation and workmanship for a period of (2) years from the date of substantial completion.

1.8 Maintenance

A. Keep the interior and exterior panel surfaces clean. Immediately remove dust, dirt, mud, mortar, chalk, excess sealants or any other type of foreign substance from the panel surfaces.
B. Refer to the PAC-CLAD IMP Handling & Maintenance Guide for more specific information regarding handling, storage, strippable film, steel debris, corrosion, cleaning and field painting.

PART 2 - PRODUCT

2.1 Manufacturer/Supplier

Petersen Aluminum Corporation
1005 Tonne Road
Elk Grove Village, IL 60007
Phone: (800) PAC-CLAD
Fax: (800) 722-7150
E-mail: info@pac-clad.com
Internet: www.pac-clad.com

2.2 System:

A. Prefinished metal wall panels, subgirt framing assembly, fasteners and anchors supported by framing or other substrate provided by others; site assembled.

2.3 Components / Materials:

A. Panels
    1. Type: Insulated Metal Wall Panels consisting of roll-formed interior and exterior profiles chemically bonded to a continuously, foamed-in-place, polyisocyanurate, insulating core.
    2. Classification
        a. FM Global *4880* Approved Class 1 Fire Rated Insulated Wall/Ceiling System.
        b. FM Global *4881* Approved Class 1 Exterior Wall System.
        c. State of Florida Approved Building Product
        d. Miami Dade County Approved
    3. Design-Lok
        a. Panel Use: Exterior Wall
        b. Coverage Width: 42-inch
        c. Thickness: 2, 2.5, 3, 4-inch
        d. Length: 8’-0” to 40’-0”
        e. Exterior Gauge: 26, 24
        f. Interior Gauge: 26
        g. Exterior Substrate: Galvalume®, G90
        h. Interior Substrate: Galvalume®, G90, Stainless Steel
        i. Exterior Finish: Siliconized Polyester, low-gloss PVDF
        j. Interior Finish: Polyester, Siliconized Polyester, Plastisol (PVC)
        k. Exterior Texture: Heavy Embossed
        l. Interior Texture: Embossed, smooth
        m. Joint: Green-Lock, offset double tongue-and-groove
        n. Core: Continuously poured-in-place polyisocyanurate insulating foam
        o. R-Value: R-8 per inch of thickness (nominal)
    4. Max-Lok
        a. Panel Use: Partition Wall, Liner Wall, Tee Supported Ceiling
        b. Coverage Width: 45-inch
        c. Thickness: 3, 4, 5, 6-inch
        d. Length: 8’-0” to 53’-0”
        e. Exterior Gauge: 26
        f. Interior Gauge: 26
        g. Exterior Substrate: Galvalume®

h. Interior Substrate: Galvalume®
i. Exterior Finish: Polyester, Siliconized Polyester, Plastisol (PVC)
j. Interior Finish: Polyester, Siliconized Polyester, Plastisol (PVC)
k. Exterior Texture: Embossed, Smooth
l. Interior Texture: Embossed, Smooth
m. Joint: Green-Lock, offset double tongue-and-groove
n. Core: Continuously poured-in-place polyisocyanurate insulating foam
o. R-Value: R-8 per inch of thickness (nominal)

5. Mesa-Lok
   a. Panel Use: Exterior Wall, Partition Wall, Liner Wall, Ceiling
   b. Coverage Width: 42-inch
   c. Thickness: 2, 2.5, 3, 4, 5, 6-inch
   d. Length: 8’-0” to 53’-0”
   e. Exterior Gauge: 26, 24, 22
   f. Interior Gauge: 26
   g. Exterior Substrate: Galvalume®, G90, Stainless Steel
   h. Interior Substrate: Galvalume®, G90, Stainless Steel
   i. Exterior Finish: Polyester, Siliconized Polyester, low-gloss PVDF, Plastisol (PVC)
   j. Interior Finish: Polyester, Siliconized Polyester, Plastisol (PVC)
   k. Exterior Texture: Embossed, Smooth
   l. Interior Texture: Embossed, Smooth
   m. Joint: Green-Lock, offset double tongue-and-groove
   n. Core: Continuously poured-in-place polyisocyanurate insulating foam
   o. R-Value: R-8 per inch of thickness (nominal)
6. Mesa-Lok HSE
   a. Panel Use: Exterior Wall
   b. Coverage Width: 42-inch
   c. Thickness: 2, 2.5, 3, 4, 5, 6-inch
   d. Length: 8’-0” to 53’-0”
   e. Exterior Gauge: 26, 24
   f. Interior Gauge: 26
   g. Exterior Substrate: Galvalume®, G90
   h. Interior Substrate: Galvalume®, G90, Stainless Steel
   i. Exterior Finish: Siliconized Polyester, low-gloss PVDF
   j. Interior Finish: Polyester, Siliconized Polyester, Plastisol (PVC)
   k. Exterior Texture: Heavy Stucco Embossed (HSE)
   l. Interior Texture: Embossed, Smooth
   m. Joint: Green-Lock, offset double tongue-and-groove
   n. Core: Continuously poured-in-place polyisocyanurate insulating foam
   o. R-Value: R-8 per inch of thickness (nominal)
7. Shadow-Lok
   a. Panel Use: Exterior Wall
   b. Coverage Width: 42-inch
   c. Thickness: 2, 2.5, 3, 4, 5, 6-inch
   d. Length: 8’-0” to 53’-0”
   e. Exterior Gauge: 26, 24, 22
   f. Interior Gauge: 26
   g. Exterior Substrate: Galvalume®, G90
   h. Interior Substrate: Galvalume®, G90, Stainless Steel
   i. Exterior Finish: Siliconized Polyester, low-gloss PVDF
   j. Interior Finish: Polyester, Siliconized Polyester, Plastisol (PVC)
   k. Exterior Texture: Embossed, Smooth
   l. Interior Texture: Embossed, Smooth
   m. Joint: Green-Lock, offset double tongue-and-groove
   n. Core: Continuously poured-in-place polyisocyanurate insulating foam
   o. R-Value: R-8 per inch of thickness (nominal)
8. Corr-Lok
   a. Panel Use: Exterior Wall
   b. Coverage Width: 42-inch

c. Thickness: 2, 2.5, 3, 4-inch
d. Length: 8’-0” to 40’-0”
e. Exterior Gauge: 24, 22
f. Interior Gauge: 26
g. Exterior Substrate: Galvalume®, G90
h. Interior Substrate: Galvalume®, G90
i. Exterior Finish: Siliconized Polyester, low-gloss PVDF
j. Interior Finish: Polyester, Siliconized Polyester
k. Exterior Texture: Embossed, Smooth
l. Interior Texture: Embossed, Smooth
m. Joint: Green-Lock, offset double tongue-and-groove
n. Core: Continuously poured-in-place polyisocyanurate insulating foam
o. R-Value: R-8 per inch of thickness (nominal)

B. Flashing
1. Match all flashings and trims with the adjacent panels in material gauge and finish. Install these trims per the panel manufacturer’s details.

C. Accessories
1. Clips
a. 14-ga., 4”, 5-hole wall panel clip (AC-01)
b. 14-ga., 8”, 3-hole wall panel clip (BAC-08)
c. 12-ga., 12”, 3-hole wall panel clip (BAC-12)
2. Fasteners – Self-Drilling or Self-Tapping, Hex Head of appropriate length.
3. Closures – UV resistant per the manufacturer’s details (if necessary).

D. Sealers
1. Tube Sealants
a. Non-skinning
b. Polyurethane
2. Tape Sealants
a. Butyl

2.4 System Performance

A. Structural
1. Load Capacity - Determine positive and negative load resistance based on tests conducted in accordance with ASTM E 1592 and/or ASTM E 72.
2. Load Calculation – Dictated by ASCE 7 16 and the building dimensions
3. Deflection Limit – per code or L/180, whichever is greater.
4. Connection – Designed considering the load (psf), tributary area (sqft), ultimate fastener pullout/pullover (lbs.) and appropriate factor of safety.
5. Factor of Safety (panel): 2.0
6. Factor of Safety (fasteners)
a. Two fasteners into steel: 2.25
b. One fastener into steel: 3.00
c. One or two fasteners into masonry: 4.00
7. Material Thickness – The delivered material thickness (steel) shall be within 95% of the design thickness.
8. Impact Resistance
a. Very severe hail (VSH) resistance when tested in accordance with FM Standard 4881.
b. Large Missile Impact tested in accordance with Miami Dade County TAS 201.
9. Water-tightness
a. Verify the panels allow no uncontrolled water penetration when subjected to a pressure differential of - 20-psf when tested in accordance with ASTM E 331.
10. Air-tightness
a. Verify the panels allow no more than 0.0011 cfm/sf at a pressure differential of +/- 20-psf when tested in accordance with ASTM E 283.
11. Metal Facing to Foam Core Bond Strength
a. Fatigue – Upon being subjected to two-million alternating cycles of L/180

deflection, the panels shall exhibit no evidence of delamination of the fascia or liner elements, cracking of the foam core, or permanent set.

b. Freeze/Heat Cycling – At the conclusion of twenty-one (21) eight-hour temperature cycles (-20° F to 180° F), the panels shall exhibit no evidence of delamination, blistering or permanent set.
c. Humidity – After enduring 1200 hours of 93% humidity at a temperature of 158° F, the panels shall exhibit no evidence of delamination, blistering or interface corrosion.
d. Autoclave – When exposed to 218°F and a pressure of 2-psig for 2-1/2 hours, the panels shall exhibit no delamination of the foam core from the metal skins.

12. Energy Efficiency
    a. When tested in accordance with ASTM C 518 the panels provide a K-factor of: 0.139 Btu-in/hr-ft2-F° @ 75° F mean temperature (R-7.20) and 0.129 Btu-in/hr-ft2-F° @ 35° F mean temperature (R-7.75).
13. Fire Safety
    a. The panels will be classified according to FM 4880 for unlimited height and NFPA 285.
14. Surface Burning Characteristics
    a. Verify the panels have a maximum *Flame Spread* of 25 and maximum *Smoke Developed* of 450 when tested in accordance with ASTM E84.
15. Material Compatibility
    a. Prevent galvanic action of dissimilar metals. This includes but is not limited to any direct contact of panels and/or trim with treated lumber or copper lightening attenuation equipment or indirect contact constituted by water runoff from HVAC drain-lines, etc.

PART 3 - EXECUTION

3.1 General

A. The Contractor, upon entering into a contract to erect the Wall Panel System, claims itself competent in the erection of these systems and is responsible for complying with all applicable local federal and state construction and safety regulations, including OSHA regulations.

3.2 Preparation

A. Contractor - Before wall panel installation begins, meticulously review and accept the shop drawings as correct.

3.3 Examination

A. Shipment - Immediately upon delivery of the wall panels and accessories, crosscheck the delivered materials against the shipper to insure a complete shipment.
B. Substrate – Before installation begins, inspect and accept the structure with regard to plumb, level and true. The maximum deviation of steel alignment shall be limited to 0 (+\-) 3/16” from the control with a 1/8” maximum change in deviation for any member of any 10-ft panel run. The Contractor shall not proceed with installation if the structural steel is not within the specified tolerances.
C. Panels – During installation, examine the individual panels. Immediately notify the manufacturer of any panel defects. Do not install defective panels.

3.4 Installation

A. Panels
    1. Install in accordance with the manufacturer’s recommended procedures, details and the construction drawings. Install the panels plumb, level and true. If necessary, make panel cuts with a “metal cutting” circular saw.
B. Fasteners
    1. Install fasteners in the locations shown on the construction drawings. Take care not to overdrive fasteners. Replace stripped fasteners by installing a new fastener in a

different location.

C. Trim
    1. Install the flashing true-to-line and level or plumb and in accordance with the manufacture's details and the construction drawings.

D. Sealants
    1. Before sealants are applied, clean and prime the surfaces according to the sealant manufacturer's guidelines. Locate the sealants per the manufacturer's details and the shop drawings without skips or voids.

3.5 Installation Guide:

A. Refer to the PAC-CLAD IMP Installation Guide for specific information regarding accountability, conditions, heavy equipment, verification of structure, alignment, side-joints, vapor barrier, sealants, field applied insulation, threaded fasteners, strippable film, field cutting, appearance, general installation sequence and details.
    1. Do not place utility penetrations through panel seams.
    2. Do not allow panels or trim to come into contact with dissimilar materials. Protect from water run-off from these materials.

3.6 Protection

A. Protect metal wall panels until completion of project.
B. Remove any and all strippable films either prior to or directly following installation. Take measures to avoid exposure of the film to direct sunlight for more than 24 hours.

3.7 Cleaning

A. Touch Up – "Touch up" minor damage to factory applied finishes using factory approved, matching coatings provided by the manufacturer.
B. Soap - If necessary, clean panel surfaces with a combination of water and a light detergent.

END OF SECTION

SECTION 075423 - THERMOPLASTIC POLYOLEFIN (TPO) ROOFING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Adhered thermoplastic polyolefin (TPO) roofing system.
2. Roof insulation.

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 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For roofing system. Include plans, elevations, sections, details, and attachments to other work.

1.4 INFORMATIONAL SUBMITTALS

A. Research/Evaluation Reports: For components of roofing system, from ICC-ES.

B. Sample Warranties: For manufacturer's special warranties.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance Data: For roofing system to include in maintenance manuals.

1.6 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.

1.7 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: 30 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

1. Carlisle SynTec Incorporated.
2. Firestone Building Products.
3. GAF Materials Corporation.
4. Johns Manville.

B. Source Limitations: Obtain components including fasteners 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 uplift pressures as required by applicable building codes:

1. Corner Uplift Pressure: .
2. Perimeter Uplift Pressure: .
3. Field-of-Roof Uplift Pressure: .

D. Solar Reflectance Index: Not less than 29 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. Energy Performance: Roofing system shall have an initial solar reflectance index of not less than 0.70 and an emissivity of not less than 0.75 when tested according to CRRC-1.

G. Exterior Fire-Test Exposure: ASTM E 108 or UL 790 ; for application and roof slopes indicated; testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

H. Fire-Resistance Ratings: Comply with fire-resistance-rated assembly designs indicated. Identify products with appropriate markings of applicable testing agency.

2.3 TPO ROOFING

A. Fabric-Reinforced TPO Sheet: ASTM D 6878, internally fabric- or scrim-reinforced, uniform, flexible TPO sheet.

1. Thickness: 60 mils (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.

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 1396/C 1396M, Type X gypsum board, 5/8 inch (16 mm) thick.

B. Substrate Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch (13 mm) thick.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. CertainTeed Corporation; GlasRoc Sheathing .
b. Georgia-Pacific Corporation; Dens Deck .
c. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.
d. USG Corporation; Securock Glass Mat Roof Board.

C. Substrate Board: ASTM C 1278/C 1278M, cellulosic-fiber-reinforced, water-resistant gypsum substrate, 1/2 inch (13 mm) thick.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. USG Corporation; Securock Gypsum-Fiber Roof Board.

D. 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 ROOF INSULATION

A. Extruded-Polystyrene Board Insulation: ASTM C 578, Type IV, 1.6-lb/cu. ft. (26-kg/cu. m) minimum density, square edged.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:

a. DiversiFoam Products.
b. Dow Chemical Company (The).
c. Owens Corning.
d. Pactiv Corporation.

B. Tapered Insulation: Provide factory-tapered insulation boards fabricated to slope of 1/4 inch per 12 inches (1:48) unless otherwise indicated.

C. Provide preformed saddles, crickets, tapered edge strips, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

2.7 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.

C. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch (13 mm) thick.

1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:

   a. CertainTeed Corporation; [**GlasRoc Sheathing**] [**GlasRoc Sheathing Type X**].
   b. Georgia-Pacific Corporation; [**Dens Deck**] [**Dens Deck DuraGuard**] [**Dens Deck Prime**].
   c. National Gypsum Company; Gold Bond eXP Extended Exposure Sheathing.
   d. Temple-Inland, Inc; GreenGlass Exterior Sheathing.
   e. USG Corporation; Securock Glass Mat Roof Board.
   f. <**Insert manufacturer's name; product name or designation**>.

D. Protection Mat: Woven or nonwoven polypropylene, polyolefin, or polyester fabric, water permeable and resistant to UV degradation, type and weight as recommended by roofing system manufacturer for application.

2.8 ASPHALT MATERIALS

A. Roofing Asphalt: ASTM D 312, Type III or Type IV .

B. Asphalt Primer: ASTM D 41/D 41M.

2.9 WALKWAYS

A. Flexible Walkways: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway [pads] [or] [rolls], approximately 3/16 inch (5 mm) thick and acceptable to roofing system manufacturer.

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 and to not void warranty for existing roofing system.

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 top flanges of steel deck to resist uplift pressure at corners, perimeter, and field of roof according to roofing system manufacturers' written instructions.

3.3 INSULATION INSTALLATION

A. Coordinate installing roofing system components so insulation is not exposed to precipitation or left exposed at the end of the workday.

B. Install tapered insulation under area of roofing to conform to slopes indicated.

C. Install insulation under area of roofing to achieve required thickness. Where overall insulation thickness is 2.7 inches (68 mm) or greater, install two or more layers with joints of each succeeding layer staggered from joints of previous layer a minimum of 6 inches (150 mm) in each direction.

1. Where installing composite and noncomposite insulation in two or more layers, install noncomposite board insulation for bottom layer and intermediate layers, if applicable, and install composite board insulation for top layer.

D. Adhered Insulation: Install each layer of insulation and adhere to substrate as follows:

1. Prime surface of concrete deck with asphalt primer at rate of 3/4 gal./100 sq. ft. (0.3 L/sq. m), and allow primer to dry.
2. Set each layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F (14 deg C) of equiviscous temperature.
3. Set each layer of insulation in insulation adhesive, firmly pressing and maintaining insulation in place.

E. Mechanically Fastened Insulation: Install each layer of insulation and secure to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten insulation to resist uplift pressure at corners, perimeter, and field of roof.

F. Mechanically Fastened and Adhered Insulation: Install each layer of insulation to deck using mechanical fasteners specifically designed and sized for fastening specified board-type roof insulation to deck type.

1. Fasten first layer of insulation to resist uplift pressure at corners, perimeter, and field of roof.
2. Set each subsequent layer of insulation in a solid mopping of hot roofing asphalt, applied within plus or minus 25 deg F (14 deg C) of equiviscous temperature.
3. Set each subsequent layer of insulation in insulation adhesive, firmly pressing and maintaining insulation in place.

3.4 ADHERED ROOFING INSTALLATION

A. Adhere 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. Bonding Adhesive: Apply to substrate and underside of roofing at rate required by manufacturer, and allow to partially dry before installing roofing. Do not apply to splice area of roofing.

D. In addition to adhering, mechanically fasten roofing securely at terminations, penetrations, and perimeter of roofing.

E. Seams: Clean seam areas, overlap roofing, and hot-air weld side and end laps of roofing and sheet flashings according to manufacturer's written instructions, to ensure a watertight seam installation.

1. Test lap edges with probe to verify seam weld continuity. Apply lap sealant to seal cut edges of sheet.
2. Verify field strength of seams a minimum of twice daily, and repair seam sample areas.
3. Repair tears, voids, and lapped seams in roofing that do not comply with requirements.

F. Spread sealant bed over deck-drain flange at roof drains, and securely seal roofing in place with clamping ring.

3.5 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.

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 075423

SECTION 076200 - SHEET METAL FLASHING AND TRIM

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Counterflashing at mManufactured reglets.
   2. Formed roof-drainage sheet metal fabrications.
   3. Formed low-slope roof sheet metal fabrications
   4. Formed wall sheet metal fabrications.

B. Related Requirements:

   1. Section 061000 "Rough Carpentry" for wood nailers, curbs, and blocking.
   2. Section 075323 Ethylene-Propolyene-Dine-Monomer (EDPM) Roofing" for materials and installation of sheet metal flashing and trim integral with roofing.
   3. Section 077200 "Roof Accessories" for set-on-type curbs, equipment supports, roof hatches, vents, and other manufactured roof accessory units.

1.3 COORDINATION

A. Coordinate sheet metal flashing and trim layout and seams with sizes and locations of penetrations to be flashed, and joints and seams in adjacent materials.

B. Coordinate sheet metal flashing and trim installation with adjoining roofing and wall materials, joints, and seams to provide leakproof, secure, and noncorrosive installation.

1.4 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

   1. Review construction schedule. Verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   2. Review special roof details, roof drainage, roof-penetration flashing, equipment curbs, and condition of other construction that affect sheet metal flashing and trim.
   3. Review requirements for insurance and certificates if applicable.
   4. Review sheet metal flashing observation and repair procedures after flashing installation.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each manufactured product and accessory.

B. Sustainable Design Submittals:
1. Refer to Section 01 8113 for sustainable design submittal requirements.

C. Shop Drawings: For sheet metal flashing and trim.

1. Include plans, elevations, sections, and attachment details.
2. Detail fabrication and installation layouts, expansion-joint locations, and keyed details. Distinguish between shop- and field-assembled work.
3. Include identification of material, thickness, weight, and finish for each item and location in Project.
4. Include details for forming, including profiles, shapes, seams, and dimensions.
5. Include details for joining, supporting, and securing, including layout and spacing of fasteners, cleats, clips, and other attachments. Include pattern of seams.
6. Include details of termination points and assemblies.
7. Include details of special conditions.
8. Include details of connections to adjoining work.
9. Detail formed flashing and trim at scale of not less than 3 inches per 12 inches (1:5).

D. Samples for Initial Selection: For each type of sheet metal and accessory indicated with factory-applied finishes.

E. Samples for Verification: For each type of exposed finish.

1. Sheet Metal Flashing: 12 inches (300 mm) long by actual width of unit, including finished seam and in required profile. Include fasteners, cleats, clips, closures, and other attachments.
2. Trim, Metal Closures, Expansion Joints, Joint Intersections, and Miscellaneous Fabrications: 12 inches (300 mm) long and in required profile. Include fasteners and other exposed accessories.
3. Unit-Type Accessories and Miscellaneous Materials: Full-size Sample.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For fabricator.

B. Product Certificates: For each type of coping and roof edge flashing that is FM Approvals approved.

C. Product Test Reports: For each product, for tests performed by a qualified testing agency.

D. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For sheet metal flashing and trim, and its accessories, to include in maintenance manuals.

1.8 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 FM Approvals approved, shop shall be listed as able to fabricate required details as tested and approved.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Do not store sheet metal flashing and trim materials in contact with other materials that might cause staining, denting, or other surface damage. Store sheet metal flashing and trim materials away from uncured concrete and masonry.

B. Protect strippable protective covering on sheet metal flashing and trim from exposure to sunlight and high humidity, except to extent necessary for period of sheet metal flashing and trim installation.

1.10 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. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Finish Warranty Period: 10 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. Sheet Metal Standard for Flashing and Trim: Comply with SMACNA's "Architectural Sheet Metal Manual" requirements for dimensions and profiles shown unless more stringent requirements are indicated.

C. FM Approvals Listing: Manufacture and install copings that are listed in FM Approvals' "RoofNav" and approved for windstorm classification, Class 1-90. Identify materials with name of fabricator and design approved by FM Approvals.

D. SPRI Wind Design Standard: Manufacture and install copings tested according to SPRI ES-1 and capable of resisting the following design pressure:

1. Design Pressure: <**Insert design pressure**>.

E. Refer to Section 01 8113 for sustainable design submittal requirements Thermal Movements: Allow for thermal movements from ambient and surface temperature changes to prevent buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change: 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. Aluminum Sheet: ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer for finish required, with temper as required to suit forming operations and performance required; with smooth, flat surface.

1. Exposed Coil-Coated Finish:

a. Two-Coat Fluoropolymer: AAMA 2605. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

2. Color: As selected by Architect from manufacturer's full range Refer to Exterior Finish Schedule for information.
3. Concealed Finish: Pretreat with manufacturer's standard white or light-colored acrylic or polyester backer finish, consisting of prime coat and wash coat with minimum total dry film thickness of 0.5 mil (0.013 mm).

C. Stainless-Steel Sheet: ASTM A 240/A 240M, Type 304, dead soft, fully annealed; with smooth, flat surface.

1. Finish: 2B (bright, cold rolled).

2.3 UNDERLAYMENT MATERIALS

A. Felt: ASTM D 226/D 226M, Type II (No. 30), asphalt-saturated organic felt; nonperforated.

B. 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. Basis-of-Design Product: Subject to compliance with requirements, provide Carlisle Coatings & Waterproofing Inc ; CCW WIP 300HT. or a comparable product by one of the following:

   a. Owens Corning

   b. GCP Applied Technologies Inc. (formerly Grace Construction Products)
2. Thermal Stability: ASTM D 1970; stable after testing at 240 deg F (116 deg C) or higher.
3. Low-Temperature Flexibility: ASTM D 1970; passes after testing at minus 20 deg F (29 deg C) or lower.

C. 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, 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 Aluminum Sheet: Aluminum or Series 300 stainless steel.
3. Fasteners for Stainless-Steel Sheet: Series 300 stainless steel.

C. 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.

D. Elastomeric Sealant: ASTM C 920, elastomeric polyurethane polymer sealant; of type, grade, class, and use classifications required to seal joints in sheet metal flashing and trim and remain watertight.

E. Butyl Sealant: ASTM C 1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied for hooked-type expansion joints with limited movement.

F. Epoxy Seam Sealer: Two-part, noncorrosive, aluminum seam-cementing compound, recommended by aluminum manufacturer for exterior nonmoving joints, including riveted joints.

2.5 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. Fabricate sheet metal flashing and trim in thickness or weight needed to comply with performance requirements, but not less than that specified for each application and metal.
2. Obtain field measurements for accurate fit before shop fabrication.
3. 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.
4. Conceal fasteners and expansion provisions where possible. Do not use exposed fasteners on faces exposed to view.

B. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to a tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

C. Fabrication Tolerances: Fabricate sheet metal flashing and trim that is capable of installation to tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

D. 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.

E. 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.

F. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal.

G. Fabricate cleats and attachment devices of sizes as recommended by cited sheet metal standard and by FM Global Property Loss Prevention Data Sheet 1-49 for application, but not less than thickness of metal being secured.

H. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints where necessary for strength.

I. Do not use graphite pencils to mark metal surfaces.

2.6 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 flat-stock 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, gutter bead reinforcing bars, and gutter accessories from same metal as gutters. Shop fabricate interior and exterior corners.

1. Gutter Profile: Style K according to cited sheet metal standard.

2. Gutters with Girth 16 to 20 Inches (410 to 510 mm): Fabricate from the following materials:
   a. Aluminum: 0.040 inch (1.02 mm) thick.

B. Downspouts: Fabricate rectangular downspouts to dimensions indicated, complete with mitered elbows. Furnish with metal hangers from same material as downspouts and anchors.

1. Fabricated Hanger Style: according to SMACNA's "Architectural Sheet Metal Manual."
2. Fabricate from the following materials:
   a. Aluminum: 0.024 inch (0.61 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. Stainless Steel: 0.019 inch (0.48 mm) thick.

D. Parapet Overflow Scupper: Fabricate scuppers to dimensions required, with closure flange trim to exterior, 4-inch- (100-mm-) wide wall flanges to interior, and base positioned 4 inches (100 mm) above roof plane. Provide discharge on outsider face 4 inches beyond face of exterior wall. Fabricate from the following materials:
   1. Stainless Steel: 0.019 inch (0.48 mm) thick.

E. Conductor Heads: Fabricate conductor heads with flanged back and stiffened top edge and of dimensions and shape required, complete with outlet tubes, exterior flange trim, and built-in overflows. Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.

F. Splash Pans: Fabricate to dimensions and shape required and from the following materials:
   1. Stainless Steel: 0.019 inch (0.48 mm) thick.

2.7 LOW-SLOPE ROOF SHEET METAL FABRICATIONS

A. 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 seal watertight. Shop fabricate interior and exterior corners.

   1. Coping Profile: As indicated on the drawings."
   2. Joint Style: Butted with expansion space and 6-inch- (150-mm-) wide, concealed backup plate.
   3. Fabricate from the Following Materials:
      a. Aluminum: 0.050 inch (1.27 mm) thick.
      b. Stainless Steel: 0.025 inch (0.64 mm) thick.
   4. > thick.

B. Counterflashing: Shop fabricate interior and exterior corners. Fabricate from the following materials:
   1. Aluminum: 0.032 inch (0.81 mm) thick.
   2. Stainless Steel: 0.019 inch (0.48 mm) thick.
   3. .

2.8 WALL SHEET METAL FABRICATIONS

A. Opening Flashings in Frame Construction: Fabricate head, 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. Aluminum: 0.032 inch (0.81 mm) thick.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, substrate, and other conditions affecting performance of the Work.

1. Verify compliance with requirements for installation tolerances of substrates.
2. Verify that substrate is sound, dry, smooth, clean, sloped for drainage, and securely anchored.
3. Verify that air- or water-resistant barriers have been installed over sheathing or backing substrate to prevent air infiltration or water penetration.

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

3.2 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 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 6 inches (150 mm) staggered 24 inches (600 mm) between courses. Overlap side edges not less than 3-1/2 inches (90 mm). Roll laps and edges with roller. Cover underlayment within 14 days.

D. Apply slip sheet, wrinkle free, over underlayment before installing sheet metal flashing and trim.

3.3 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 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.
6. Do not use graphite pencils to mark metal surfaces.

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. Coat concealed side of uncoated-aluminum andstainless-steel sheet metal flashing and trim with bituminous coating where flashing and trim contact wood, ferrous metal, or cementitious construction.
2. 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 Insert size requirement.

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.

1. Use sealant-filled joints unless otherwise indicated. Embed hooked flanges of joint members not less than 1 inch (25 mm) into sealant. Form joints to completely conceal sealant. 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. Do not install sealant-type joints at temperatures below 40 deg F (4 deg C).
2. Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

G. Rivets: Rivet joints in where necessary for strength.

3.4 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.

C. Built-in Gutters: Join sections with [**riveted and soldered joints**] [**or**] [**joints sealed with sealant**]. Provide for thermal expansion. Slope to downspouts. Provide end closures and seal watertight with sealant.

1. Install underlayment layer in built-in gutter trough and extend to drip edge at eaves and under underlayment on roof sheathing. Lap sides minimum of 2 inches (50 mm) over underlying course. Lap ends minimum of 4 inches (100 mm). Stagger end laps between succeeding courses at least 72 inches (1830 mm). Fasten with roofing nails. Install slip sheet over underlayment.
2. Anchor and loosely lock back edge of gutter to continuous [**cleat**] [**eave or apron flashing**].
3. Anchor back of gutter that extends onto roof deck with cleats spaced not more than [**18 inches (460 mm)**] **<Insert dimension>** apart.
4. Install gutter with expansion joints at locations indicated, but not exceeding, [**50 feet (15.24 m)**] **<Insert dimension>** apart. Install expansion-joint caps.

D. Downspouts: Join sections with 1-1/2-inch (38-mm) telescoping joints.

1. 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.
2. Provide elbows at base of downspout to direct water away from building.
3. Connect downspouts to underground drainage system.

E. Splash Pans: Install where downspouts discharge on [**low-slope roofs**] **<Insert surface>**. Set in [**asphalt roofing cement**] [**or**] [**elastomeric sealant**] compatible with the substrate.

F. 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.

1. Anchor scupper closure trim flange to exterior wall and [**solder**] [**or**] [**seal with elastomeric sealant**] to scupper.
2. Loosely lock front edge of scupper with conductor head.
3. [**Solder**] [**or**] [**seal with elastomeric sealant**] exterior wall scupper flanges into back of conductor head.

G. Conductor Heads: Anchor securely to wall, with elevation of conductor head rim at minimum of 1 inch (25 mm) below [**scupper**] [**or**] [**gutter**] discharge.

H. 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.

3.5 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 at [**staggered 3-inch (75-mm)**] **<Insert spacing>** centers.

C. Roof Edge Flashing: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for FM Approvals' listing for required windstorm classification.

D. Copings: Anchor to resist uplift and outward forces according to recommendations in cited sheet metal standard unless otherwise indicated.

1. Interlock exterior bottom edge of coping with continuous cleat anchored to substrate at [**24-inch (600-mm)**] [**16-inch (400-mm)**] **<Insert dimension>** centers.
2. Anchor interior leg of coping with washers and screw fasteners through slotted holes at [**24-inch (600-mm)**] **<Insert dimension>** centers.

E. Copings: Anchor to resist uplift and outward forces according to recommendations in FM Global Property Loss Prevention Data Sheet 1-49 for specified FM Approvals' listing for required windstorm classification.

F. 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.

G. 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). Secure in waterproof manner by means of [**snap-in installation and sealant or lead wedges and sealant**] [**interlocking folded seam or blind rivets and sealant**] [**anchor and washer at 36-inch (910-mm) centers**] **<Insert requirement>** unless otherwise indicated.

H. Roof-Penetration Flashing: Coordinate installation of roof-penetration flashing with installation of roofing and other items penetrating roof. Seal with [**elastomeric**] [**butyl**] sealant and clamp flashing to pipes that penetrate roof.

3.6 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. Through-Wall Flashing: Installation of through-wall flashing is specified in [**Section 042000 "Unit Masonry."**] [**Section 044200 "Exterior Stone Cladding."**] [**Section <Insert Section number> "<Insert Section title>."**]

C. Reglets: Installation of reglets is specified in [**Section 033000 "Cast-in-Place Concrete."**] [**Section 042000 "Unit Masonry."**] [**Section <Insert Section number> "<Insert Section title>."**]

D. Opening Flashings in Frame Construction: Install continuous head, sill,[**jamb,**] and similar flashings to extend [**4 inches (100 mm)**] **<Insert dimension>** beyond wall openings.

3.7 MISCELLANEOUS FLASHING INSTALLATION

A. Equipment Support Flashing: Coordinate installation of equipment support flashing with installation of roofing and equipment. Weld or seal flashing with elastomeric sealant to equipment support member.

B. Overhead-Piping Safety Pans: Suspend pans from structure above, independent of other overhead items such as equipment, piping, and conduit, unless otherwise indicated on Drawings. Pipe and install drain line to plumbing waste or drainage system.

3.8 ERECTION TOLERANCES

A. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerance of 1/4 inch in 20 feet (6 mm in 6 m) on slope and location lines indicated on Drawings and within 1/8-inch (3-mm) offset of adjoining faces and of alignment of matching profiles.

B. Installation Tolerances: Shim and align sheet metal flashing and trim within installed tolerances specified in MCA's "Guide Specification for Residential Metal Roofing."

3.9 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. On completion of sheet metal flashing and trim installation, remove unused materials and clean finished surfaces as recommended by sheet metal flashing and trim manufacturer. Maintain sheet metal flashing and trim in clean condition during construction.

E. Replace sheet metal flashing and trim that have been damaged or that have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 076200

SECTION 078413 - PENETRATION FIRESTOPPING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Penetrations in fire-resistance-rated walls.
   2. Penetrations in horizontal assemblies.

B. Related Sections:

1.3 SUBMITTALS

A. Product Data: For each type of product indicated.
   1. Product Data: For penetration firestopping, including printed statement of VOC content and chemical components.

B. 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.

C. Qualification Data: For qualified Installer.

D. Installer Certificates: From Installer indicating penetration firestopping has been installed in compliance with requirements and manufacturer's written recommendations.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for penetration firestopping.

1.4
1.05 QUALITY ASSURANCE

A. Use adequate numbers of skilled workmen thoroughly trained and experienced in the necessary crafts and completely familiar with the specified requirements and methods needed for proper performance of the work of this Section.
B. Applicator Qualifications:

1. Applicator shall have at least three years experience in installing materials of types specified and shall have successfully completed at least three projects of similar scope and complexity.
2. Applicator shall designate a single individual as project foreman who shall be on site at all times during installation.

C. Single source responsibility for firestopping materials:
1. Obtain firestop materials from single manufacturer for each different product required.
Manufacturer shall instruct applicator in procedures for each material.

D. Regulatory Requirements:
1. Firestop System installation must meet requirements of ASTM E-814, UL 1479 or UL 2079 tested assemblies that provide a fire rating equal to that of construction being penetrated.
2. Proposed firestop materials and methods shall conform to applicable governing codes having local jurisdiction.
3. For those firestop applications that exist for which no UL tested system is available through any manufacturer, a manufacturer's engineering judgement derived from similar independently tested system designs will be submitted to local authorities having jurisdiction for their review and approval prior to installation. Manufacturer's engineer judgement drawings must follow requirements set forth by the International Firestop Council.

1.5

A. Preinstallation Conference: Conduct conference at Project site .

1.6 PROJECT CONDITIONS

A. Environmental Limitations: Do not install penetration firestopping when ambient or substrate temperatures are outside limits permitted by penetration firestopping manufacturers or when substrates are wet because of rain, frost, condensation, or other causes.

B. Install and cure penetration firestopping per manufacturer's written instructions using natural means of ventilations or, where this is inadequate, forced-air circulation.

1.7 COORDINATION

A. Coordinate construction of openings and penetrating items to ensure that penetration firestopping is installed according to specified requirements.

B. Coordinate sizing of sleeves, openings, core-drilled holes, or cut openings to accommodate penetration firestopping.

C. Notify Owner's testing agency at least seven days in advance of penetration firestopping installations; confirm dates and times on day preceding each series of installations.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Manufacturers Basis of Design: Tremco Firestopping 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. Tremco Firestopping
   2. A/D Fire Protection Systems Inc.
   3. Grace Construction Products.
   4. Johns Manville.
   .
   5. NUCO Inc.
   6. Passive Fire Protection Partners.
   .
   7. USG Corporation.

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: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
   1. Fire-resistance-rated walls include fire-barrier walls and fire partitions.
   2. F-Rating: Not less than the fire-resistance rating of constructions penetrated.

C. Penetrations in Horizontal Assemblies: Provide penetration firestopping with ratings determined per ASTM E 814 or UL 1479, based on testing at a positive pressure differential of 0.01-inch wg.
   1. Horizontal assemblies include floors and floor/ceiling assemblies .
   2. F-Rating: At least 1 hour, but not less than the fire-resistance rating of constructions penetrated.
   3. 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.
   4. at both ambient and elevated temperatures.

D. W-Rating: Provide penetration firestopping showing no evidence of water leakage when tested according to UL 1479.

E. 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.

F. VOC Content: Provide penetration firestopping that complies with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):
   1. Architectural Sealants: 50 g/L.
   2. Sealant Primers for Nonporous Substrates: 50 g/L.
   3. Sealant Primers for Porous Substrates: 50 g/L.

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.
   1. Permanent forming/damming/backing materials, including the following:
      a. Slag-wool-fiber or rock-wool-fiber insulation.
      b. Sealants used in combination with other forming/damming/backing materials to prevent leakage of fill materials in liquid state.
      c. Fire-rated form board.
      d. Fillers for sealants.
   2. Temporary forming materials.
   3. Substrate primers.
   4. Collars.
   5. Steel sleeves.

2.3 FILL MATERIALS

A. Cast-in-Place Firestop Devices: Factory-assembled devices for use in cast-in-place concrete floors and consisting of an outer metallic sleeve lined with an intumescent strip, a radial extended flange attached to one end of the sleeve for fastening to concrete formwork, and a neoprene gasket.

B. Latex Sealants: Single-component latex formulations that do not re-emulsify after cure during exposure to moisture.

C. Mortars: Prepackaged dry mixes consisting of a blend of inorganic binders, hydraulic cement, fillers, and lightweight aggregate formulated for mixing with water at Project site to form a nonshrinking, homogeneous mortar.

D. Pillows/Bags: Reusable heat-expanding pillows/bags consisting of glass-fiber cloth cases filled with a combination of mineral-fiber, water-insoluble expansion agents, and fire-retardant additives. Where exposed, cover openings with steel-reinforcing wire mesh to protect pillows/bags from being easily removed.

E. Silicone Foams: Multicomponent, silicone-based liquid elastomers that, when mixed, expand and cure in place to produce a flexible, nonshrinking foam.

F. Silicone Sealants: Single-component, silicone-based, neutral-curing elastomeric sealants of grade indicated below:

1. Grade: Pourable (self-leveling) formulation for openings in floors and other horizontal surfaces, and nonsag formulation for openings in vertical and sloped surfaces, unless indicated firestopping limits use of nonsag grade for both opening conditions.

2.4 MIXING

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

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for opening configurations, penetrating items, substrates, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Surface Cleaning: Clean out openings immediately before installing penetration firestopping to comply with manufacturer's written instructions and with the following requirements:
   1. Remove from surfaces of opening substrates and from penetrating items foreign materials that could interfere with adhesion of penetration firestopping.
   2. Clean opening substrates and penetrating items to produce clean, sound surfaces capable of developing optimum bond with penetration firestopping. Remove loose particles remaining from cleaning operation.
   3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent penetration firestopping from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing firestopping's seal with substrates.

3.3 INSTALLATION

A. General: Install penetration firestopping to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support 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.

C. 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.

3.4 IDENTIFICATION

A. Identify penetration firestopping with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches 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.

3.5 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.

3.6 CLEANING AND PROTECTION

A. Clean off excess fill materials adjacent to openings as the Work progresses by methods and with cleaning materials that are approved in writing by penetration firestopping manufacturers and that do not damage materials in which openings occur.

B. Provide final protection and maintain conditions during and after installation that ensure that penetration firestopping is without damage or deterioration at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, immediately cut out and remove

damaged or deteriorated penetration firestopping and install new materials to produce systems complying with specified requirements.

3.7 PENETRATION FIRESTOPPING SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHEZ.

B. Where Intertek ETL SEMKO-listed systems are indicated, they refer to design numbers in Intertek ETL SEMKO's "Directory of Listed Building Products" under "Firestop Systems."

C. Where FM Global-approved systems are indicated, they refer to design numbers listed in FM Global's "Building Materials Approval Guide" under "Wall and Floor Penetration Fire Stops."

D. Firestopping with No Penetrating Items:
1. F-Rating: 1 hour .
2. T-Rating: 1 hour .
3. W-Rating: No leakage of water at completion of water leakage testing.
4. Type of Fill Materials: As required to achieve rating .

E. Firestopping for Metallic Pipes, Conduit, or Tubing:
1. UL-Classified Systems: C-AJ-1148 W-L-1054 .
2. F-Rating: 1 hour or 2 hours.
3. T-Rating: 1 hour or .
4. L-Rating at Ambient: Less than one cfm/sq. ft..
5. L-Rating at 400 deg F: Less than four cfm/sq. ft..
6. W-Rating: No leakage of water at completion of water leakage testing.
7. Type of Fill Materials: As required to achieve rating .

F. Firestopping for Nonmetallic Pipe, Conduit, or Tubing:
1. UL-Classified Systems: C-AJ- 2095 .
2. F-Rating: 1 hour or 2 hours.
3. T-Rating: 1 hour or 2 hours.
4. Type of Fill Materials: As required to achieve rating .

G. Firestopping for Electrical Cables:
1. UL-Classified Systems: W-L- 3071 .
2. F-Rating: 1 hour or 2 hours.
3. T-Rating: 1 hour or 2 hours.
4. L-Rating at Ambient: Less than one cfm/sq. ft..
5. L-Rating at 400 deg F: Less than four cfm/sq. ft..
6. Type of Fill Materials: As required to achieve rating .

H. Firestopping for Cable Trays with Electric Cables:
1. UL-Classified Systems: W-L- 4011 .
2. F-Rating: 1 hour or 2 hours.
3. T-Rating: 1 hour or 2 hours.
4. L-Rating at Ambient: Less than five cfm/sq. ft..
5. L-Rating at 400 deg F: Less than two cfm/sq. ft..
6. Type of Fill Materials: As required to achieve rating .

I. Firestopping for Miscellaneous Electrical Penetrants:
   1. F-Rating: 1 hour or 2 hours.
   2. T-Rating: 1 hour or 2 hours.
   3. Type of Fill Materials: As required to achieve rating .

J. Firestopping for Groupings of Penetrants:
   1. UL-Classified Systems: W-L- 8013 .
   2. F-Rating: 1 hour or 2 hours.
   3. T-Rating: 1 hour or 2 hours.
   4. L-Rating at Ambient: Less than five cfm/sq. ft..
   5. L-Rating at 400 deg F: Less than two cfm/sq. ft..
   6. Type of Fill Materials: As required to achieve rating .

3.8 FIRE-RESISTIVE JOINT SYSTEM SCHEDULE

A. Where UL-classified systems are indicated, they refer to system numbers in UL's "Fire Resistance Directory" under product Category XHBN or Category XHDG.

B. Wall-to-Wall, Fire-Resistive Joint Systems:
   1. UL-Classified Systems.

C. Head-of-Wall, Fire-Resistive Joint Systems:
   1. TREMCO HWD 0016 395 or equal system. Tremstop Acrylic GG or Tremsil Fyre Sil.

D. Perimeter Fire-Resistive Joint Systems:
   1. UL-Classified Perimeter Fire-Containment Systems.

E.

END OF SECTION 078413

SECTION 078446 - FIRE-RESISTIVE JOINT SYSTEMS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Joints in or between fire-resistance-rated constructions.

B. Related Sections:

1. Division 07 Section "Penetration Firestopping" for penetrations in fire-resistance-rated walls, horizontal assemblies, and smoke barriers.

1.3 SUBMITTALS

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

B. Product Schedule: For each fire-resistive joint system. Include location and design designation of qualified testing agency.

1. Where Project conditions require modification to a qualified testing agency's illustration for a particular fire-resistive joint system condition, submit illustration, with modifications marked, approved by fire-resistive joint system manufacturer's fire-protection engineer as an engineering judgment or equivalent fire-resistance-rated assembly.

C. Qualification Data: For qualified Installer.

D. Installer Certificates: From Installer indicating fire-resistive joint systems have been installed in compliance with requirements and manufacturer's written recommendations.

E. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for fire-resistive joint systems.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm that has been approved by FM Global according to FM Global 4991, "Approval of Firestop Contractors," or been evaluated by UL and found to comply with UL's "Qualified Firestop Contractor Program Requirements."

B. Fire-Test-Response Characteristics: Fire-resistive joint systems shall comply with the following requirements:

1. Fire-resistive joint system tests are performed by a qualified testing agency acceptable to authorities having jurisdiction.
2. Fire-resistive joint systems are identical to those tested per testing standard referenced in "Fire-Resistive Joint Systems" Article. Provide rated systems complying with the following requirements:

    a. Fire-resistive joint system products bear classification marking of qualified testing agency.
    b. Fire-resistive joint systems correspond to those indicated by reference to designations listed by the following:

        1) UL in its "Fire Resistance Directory."
        2) Intertek ETL SEMKO in its "Directory of Listed Building Products."

C. Preinstallation Conference: Conduct conference at Project site .

1.5 PROJECT CONDITIONS

A. Environmental Limitations: Do not install fire-resistive joint systems when ambient or substrate temperatures are outside limits permitted by fire-resistive joint system manufacturers or when substrates are wet due to rain, frost, condensation, or other causes.

B. Install and cure fire-resistive joint systems per manufacturer's written instructions using natural means of ventilation or, where this is inadequate, forced-air circulation.

1.6 COORDINATION

A. Coordinate construction of joints to ensure that fire-resistive joint systems are installed according to specified requirements.

B. Coordinate sizing of joints to accommodate fire-resistive joint systems.

PART 2 - PRODUCTS

2.1 FIRE-RESISTIVE JOINT SYSTEMS

A. Where required, provide fire-resistive joint systems that are 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 assemblies in or between which fire-resistive joint systems are installed. Fire-resistive joint systems shall accommodate building movements without impairing their ability to resist the passage of fire and hot gases.

B. Joints in or between Fire-Resistance-Rated Construction: Provide fire-resistive joint systems with ratings determined per ASTM E 1966 or UL 2079:

1. Joints include those installed in or between fire-resistance-rated walls floor or floor/ceiling assemblies and roofs or roof/ceiling assemblies.
2. Fire-Resistance Rating: Equal to or exceeding the fire-resistance rating of construction they will join.

3. 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. A/D Fire Protection Systems Inc.
    b. CEMCO.
    c. Fire Trak Corp.
    d. Grace Construction Products.
    e. Hilti, Inc.
    f. Johns Manville.
    g. Nelson Firestop Products.
    h. NUCO Inc.
    i. Passive Fire Protection Partners.
    j. RectorSeal Corporation.
    k. Specified Technologies Inc.
    l. 3M Fire Protection Products.
    m. Tremco, Inc.; Tremco Fire Protection Systems Group.
    n. USG Corporation.

C. Joints in Smoke Barriers: Provide fire-resistive joint systems with ratings determined per UL 2079.

1. L-Rating: Not exceeding 5.0 cfm/ft (0.00775 cu. m/s x m) of joint at 0.30 inch wg (74.7 Pa) at both ambient and elevated temperatures.
2. Manufacturers: Subject to compliance with requirements, provide products by one of the following :

    a. A/D Fire Protection Systems Inc.
    b. Grace Construction Products.
    c. Hilti, Inc.
    d. Johns Manville.
    e. Nelson Firestop Products.
    f. NUCO Inc.
    g. Passive Fire Protection Partners.
    h. RectorSeal Corporation.
    i. Specified Technologies Inc.
    j. 3M Fire Protection Products.
    k. Tremco, Inc.; Tremco Fire Protection Systems Group.
    l. USG Corporation.
    m. .

D. Exposed Fire-Resistive Joint Systems: 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: Provide fire-resistive joint systems that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 250 g/L.
2. Sealant Primers for Nonporous Substrates: 250 g/L.
3. Sealant Primers for Porous Substrates: 775 g/L.

F. Accessories: Provide components of fire-resistive joint systems, including primers and forming materials, that are needed to install fill materials and to maintain ratings required. Use only components specified by fire-resistive joint system manufacturer and approved by the qualified testing agency for systems indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Installer present, for compliance with requirements for joint configurations, substrates, and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Surface Cleaning: Clean joints immediately before installing fire-resistive joint systems to comply with fire-resistive joint system manufacturer's written instructions and the following requirements:

1. Remove from surfaces of joint substrates foreign materials that could interfere with adhesion of fill materials.
2. Clean joint substrates to produce clean, sound surfaces capable of developing optimum bond with fill materials. Remove loose particles remaining from cleaning operation.
3. Remove laitance and form-release agents from concrete.

B. Priming: Prime substrates where recommended in writing by fire-resistive joint system manufacturer using that manufacturer's recommended products and methods. Confine primers to areas of bond; do not allow spillage and migration onto exposed surfaces.

C. Masking Tape: Use masking tape to prevent fill materials of fire-resistive joint system from contacting adjoining surfaces that will remain exposed on completion of the Work and that would otherwise be permanently stained or damaged by such contact or by cleaning methods used to remove stains. Remove tape as soon as possible without disturbing fire-resistive joint system's seal with substrates.

3.3 INSTALLATION

A. General: Install fire-resistive joint systems to comply with manufacturer's written installation instructions and published drawings for products and applications indicated.

B. Install forming materials and other accessories of types required to support fill materials during their application and in position needed to produce cross-sectional shapes and depths required to achieve fire ratings indicated.

1. After installing fill materials and allowing them to fully cure, remove combustible forming materials and other accessories not indicated as permanent components of fire-resistive joint system.

C. Install fill materials for fire-resistive joint systems by proven techniques to produce the following results:

1. Fill voids and cavities formed by joints and forming materials as required to achieve fire-resistance ratings indicated.
2. Apply fill materials so they contact and adhere to substrates formed by joints.
3. For fill materials that will remain exposed after completing the Work, finish to produce smooth, uniform surfaces that are flush with adjoining finishes.

3.4 IDENTIFICATION

A. Identify fire-resistive joint systems with preprinted metal or plastic labels. Attach labels permanently to surfaces adjacent to and within 6 inches of joint edge so labels will be visible to anyone seeking to remove or penetrate joint system. Use mechanical fasteners or self-adhering-type labels with adhesives capable of permanently bonding labels to surfaces on which labels are placed. Include the following information on labels:

1. The words "Warning - Fire-Resistive Joint System - Do Not Disturb. Notify Building Management of Any Damage."
2. Contractor's name, address, and phone number.
3. Designation of applicable testing agency.
4. Date of installation.
5. Manufacturer's name.
6. Installer's name.

3.5 FIELD QUALITY CONTROL

A. Inspecting Agency: Owner will engage a qualified testing agency to perform tests and inspections.

B. Where deficiencies are found or fire-resistive joint systems are damaged or removed due to testing, repair or replace fire-resistive joint systems so they comply with requirements.

C. Proceed with enclosing fire-resistive joint systems with other construction only after inspection reports are issued and installations comply with requirements.

3.6 CLEANING AND PROTECTING

A. Clean off excess fill materials adjacent to joints as the Work progresses by methods and with cleaning materials that are approved in writing by fire-resistive joint system manufacturers and that do not damage materials in which joints occur.

B. Provide final protection and maintain conditions during and after installation that ensure fire-resistive joint systems are without damage or deterioration at time of Substantial Completion. If damage or deterioration occurs despite such protection, cut out and remove damaged or deteriorated fire-resistive joint systems immediately and install new materials to produce fire-resistive joint systems complying with specified requirements.

END OF SECTION 078446

SECTION 079200 - JOINT SEALANTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Silicone joint sealants.
2. Urethane Joint sealants.Latex joint sealants.for interior use only

B. Related Sections:

1. Division 04 Section "Unit Masonry" for masonry control and expansion joint fillers and gaskets.
2. Division 08 Section "Glazing" for glazing sealants.
3. Division 09 Section "Gypsum Board" for sealing perimeter joints.
4. Division 09 Section "Acoustical Panel Ceilings" for sealing edge moldings at perimeters with acoustical sealant.
5. Division 32 Section "Concrete Paving Joint Sealants" for sealing joints in pavements, walkways, and curbing.

1.3 PRECONSTRUCTION TESTING

A. Preconstruction Compatibility and Adhesion Testing: Submit to joint-sealant manufacturers, for testing indicated below, samples of materials that will contact or affect joint sealants.

1. Use ASTM C 1087 to determine whether priming and other specific joint preparation techniques are required to obtain rapid, optimum adhesion of joint sealants to joint substrates.
2. Submit not fewer than six pieces of each kind of material, including joint substrates, shims, joint-sealant backings, secondary seals, and miscellaneous materials.
3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
4. For materials failing tests, obtain joint-sealant manufacturer's written instructions for corrective measures including use of specially formulated primers.
5. Testing will not be required if joint-sealant manufacturers submit joint preparation data that are based on previous testing, not older than 24 months, of sealant

products for adhesion to, and compatibility with, joint substrates and other materials matching those submitted.

B. Preconstruction Field-Adhesion Testing: Before installing sealants, field test their adhesion to Project joint substrates as follows:

1. Locate test joints where indicated on Project or, if not indicated, as directed by Architect.
2. Conduct field tests for each application indicated below:

    a. Each kind of sealant and joint substrate indicated.

3. Notify Architect seven days in advance of dates and times when test joints will be erected.
4. Arrange for tests to take place with joint-sealant manufacturer's technical representative present.

    a. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

        1) For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

5. Report whether sealant failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. For sealants that fail adhesively, retest until satisfactory adhesion is obtained.
6. Evaluation of Preconstruction Field-Adhesion-Test Results: Sealants not evidencing adhesive failure from testing, in absence of other indications of noncompliance with requirements, will be considered satisfactory. Do not use sealants that fail to adhere to joint substrates during testing.

1.4 SUBMITTALS

A. Product Data: For each joint-sealant product indicated.

1. Product Data: For sealants and sealant primers used inside the weatherproofing system, including printed statement of VOC content.

B. Samples for Initial Selection: Manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each product exposed to view.

C. Samples for Verification: Provide 6” samples of joint sealant on substrates that will be used on the project on the mockup. Joint sealant shall be a minimum of 6” long and installed a minimum of two weeks prior to installation. .

D. Joint-Sealant Schedule: Include the following information:

1. Latex Joint-sealant application, for interior use only.
2. Neutral cure joint sealant application for Exterior Use.
3. Acetoxy Silicone mildew resistant for interior use only.

E. Qualification Data: For qualified Installer and testing agency.

F. Product Certificates: For each kind of joint sealant and accessory, from manufacturer.

G. Sealant, Waterproofing, and Restoration Institute (SWRI) Validation Certificateonly for Exterior Use Productsspecified to be validated by SWRI's Sealant Validation Program.

H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, indicating that sealants comply with requirements.Only for exterior use products.

I. Preconstruction Compatibility and Adhesion Test Reports: From sealant manufacturer, indicating the following:

1. Materials forming joint substrates and joint-sealant backings have been tested for compatibility and adhesion with joint sealants.
2. Interpretation of test results and written recommendations for primers and substrate preparation needed for adhesion.

J. Preconstruction Field-Adhesion Test Reports: Indicate which sealants and joint preparation methods resulted in optimum adhesion to joint substrates based on testing specified in "Preconstruction Testing" Article.

K. Field-Adhesion Test Reports: For each sealant application tested.

L. Warranties: Sample of special warranties.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer's authorized representative who is trained and approved for installation of units required for this Project.

B. Source Limitations: Obtain each kind of joint sealant from single source from single manufacturer.

C. Product Testing: Test joint sealants using a qualified testing agency.

1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.
2. Test Exterior Sealant according to SWRI's Sealant Validation Program for compliance with requirements specified by reference to ASTM C 920 for adhesion and cohesion under cyclic movement, adhesion-in-peel, and indentation hardness.

D. Mockups: Install sealant in mockups of assemblies specified in other Sections that are indicated to receive joint sealants specified in this Section. Use materials and installation methods specified in this Section.

E. Preinstallation Conference: Conduct conference at Project site .

1.6 PROJECT CONDITIONS

A. Do not proceed with installation of joint sealants under the following conditions:

1. When ambient and substrate temperature conditions are outside limits permitted by joint-sealant manufacturer .
2. When joint substrates are wet.
3. Where joint widths are less than those allowed by joint-sealant manufacturer for applications indicated.
4. Where contaminants capable of interfering with adhesion have not yet been removed from joint substrates.

1.7 WARRANTY

A. Special Installer's Warranty: Manufacturer's standard form in which Installer agrees to repair or replace joint sealants that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Exterior Warranty Period: 2 years from date of Substantial Completion.

2. Interior Warranty Period: 1 year from date of substantial completion.

B. Special Manufacturer's Warranty: Manufacturer's standard form in which joint-sealant manufacturer agrees to furnish joint sealants to repair or replace those that do not comply with performance and other requirements specified in this Section within specified warranty period.

1. Exterior Silicone Sealants Warranty Period: 20 years from date of Substantial Completion.

2. Exterior Urethane Joint Sealants Warranty Period: 5 years from date of substantial completion.

3. Interior Sealants Warranty Period 1 year from date of Substantial Completion

C. Special warranties specified in this article exclude deterioration or failure of joint sealants from the following:

1. Movement of the structure caused by structural settlement or errors attributable to design or construction resulting in stresses on the sealant exceeding sealant manufacturer's written specifications for sealant elongation and compression.
2. Disintegration of joint substrates from natural causes exceeding design specifications.
3. Mechanical damage caused by individuals, tools, or other outside agents.
4. Changes in sealant appearance caused by accumulation of dirt or other atmospheric contaminants.

PART 2 - PRODUCTS

2.1 MATERIALS, GENERAL

A. Compatibility: Provide joint sealants, backings, and other related materials that are compatible with one another and with joint substrates under conditions of service and application, as demonstrated by joint-sealant manufacturer, based on testing and field experience.

B. VOC Content of Interior Sealants: Provide sealants and sealant primers for use inside the weatherproofing system that comply with the following limits for VOC content when calculated according to 40 CFR 59, Part 59, Subpart D (EPA Method 24):

1. Architectural Sealants: 50 g/L.
2. Sealant Primers for Nonporous Substrates: 50 g/L.
3. Sealant Primers for Porous Substrates: 50 g/L.

C. Liquid-Applied Joint Sealants: Comply with ASTM C 920 and other requirements indicated for each liquid-applied joint sealant specified, including those referencing ASTM C 920 classifications for type, grade, class, and uses related to exposure and joint substrates.

D. Stain-Test-Response Characteristics: Where sealants are specified to be nonstaining to porous substrates, provide products that have undergone testing according to ASTM C 1248 and have not stained porous joint substrates indicated for Project.

E. Colors of Exposed Joint Sealants: As selected by Architect from manufacturer's full range.

2.2 SILICONE JOINT SEALANTS

A. Single-Component, Nonsag, Neutral-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 100/50, for Use NT.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Tremco Incorporated; Spectrem 1

.

b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
c. Pecora Corporation; 890 .

.

.

.

d. .

B. Single-Component, Pourable, Traffic-Grade, Joint Sealant: ASTM C 920, Type S, Grade P, Class 100/50, for Use T.

1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Tremco Vulkem 45SSL .
    b. May National Associates, Inc.; Bondaflex Sil 728 SG .
    c. Pecora Corporation; 300 SL .
    .
    .
    .

C. Mildew-Resistant, Single-Component, Acid-Curing Silicone Joint Sealant: ASTM C 920, Type S, Grade NS, Class 25, for Use NT.

1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
    a. Tremco Incorporated; Tremsil 200 Sanitary.

    b. BASF Building Systems; Omniplus.
    c. May National Associates, Inc.; Bondaflex Sil 100 WF.

2.3 LATEX JOINT SEALANTS

A. Latex Joint Sealant: Acrylic latex or siliconized acrylic latex, ASTM C 834, Type OP, Grade NF.

1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Tremco Incorporated; Tremflex 834

    b. BASF Building Systems; Sonolac.
    c. Bostik, Inc.; Chem-Calk 600.
    d. May National Associates, Inc.; Bondaflex 600 Bondaflex Sil-A 700.
    e. Pecora Corporation; AC-20+.
    f. Schnee-Morehead, Inc.; SM 8200.
    .

2.4 JOINT SEALANT BACKING

A. General: Provide sealant backings of material that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.

B. Cylindrical Sealant Backings: ASTM C 1330, Type C (closed-cell material with a surface skin) 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.

C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint. Provide self-adhesive tape where applicable.

2.5 MISCELLANEOUS MATERIALS

A. Primer: Material recommended by joint-sealant manufacturer where required for adhesion of sealant to joint substrates indicated, as determined from preconstruction joint-sealant-substrate tests and field tests.

B. Cleaners for Nonporous Surfaces: Chemical cleaners acceptable to manufacturers of sealants and sealant backing materials, free of oily residues or other substances capable of staining or harming joint substrates and adjacent nonporous surfaces in any way, and formulated to promote optimum adhesion of sealants to joint substrates.

C. Masking Tape: Nonstaining, nonabsorbent material compatible with joint sealants and surfaces adjacent to joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine joints indicated to receive joint sealants, with Installer present, for compliance with requirements for joint configuration, installation tolerances, and other conditions affecting joint-sealant performance.

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

3.2 PREPARATION

A. Surface Cleaning of Joints: Clean out joints immediately before installing joint sealants to comply with joint-sealant manufacturer's written instructions and the following requirements:

1. Remove all foreign material from joint substrates that could interfere with adhesion of joint sealant, including dust, paints (except for permanent, protective coatings tested and approved for sealant adhesion and compatibility by sealant manufacturer), old joint sealants, oil, grease, waterproofing, water repellents, water, surface dirt, and frost.
2. Clean porous joint substrate surfaces by brushing, grinding, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants. Remove loose particles remaining after cleaning operations above by vacuuming or blowing out joints with oil-free compressed air. Porous joint substrates include the following:

a. Concrete.
b. Masonry.
.

3. Remove laitance and form-release agents from concrete.
4. Clean nonporous joint substrate surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants. Nonporous joint substrates include the following:

a. Metal.
b. Glass.

B. Joint Priming: Prime joint substrates where recommended by joint-sealant manufacturer or as indicated by preconstruction joint-sealant-substrate tests or prior experience. Apply primer to comply with joint-sealant manufacturer's written instructions. Confine primers to areas of joint-sealant bond; do not allow spillage or migration onto adjoining surfaces.

C. Masking Tape: Use masking tape where required to prevent contact of sealant or primer with adjoining surfaces that otherwise would be permanently stained or damaged by such contact or by cleaning methods required to remove sealant smears. Remove tape immediately after tooling without disturbing joint seal.

3.3 INSTALLATION OF JOINT SEALANTS

A. General: Comply with joint-sealant manufacturer's written installation instructions for products and applications indicated, unless more stringent requirements apply.

B. Sealant Installation Standard: Comply with recommendations in ASTM C 1193 for use of joint sealants as applicable to materials, applications, and conditions indicated.

C. Install sealant backings of kind indicated to support sealants during application and at position required to produce cross-sectional shapes and depths of installed sealants relative to joint widths that allow optimum sealant movement capability.

1. Do not leave gaps between ends of sealant backings.
2. Do not stretch, twist, puncture, or tear sealant backings.
3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.

D. Install bond-breaker tape behind sealants where sealant backings are not used between sealants and backs of joints.

E. Install sealants using proven techniques that comply with the following and at the same time backings are installed:

1. Place sealants so they directly contact and fully wet joint substrates.
2. Completely fill recesses in each joint configuration.
3. Produce uniform, cross-sectional shapes and depths relative to joint widths that allow optimum sealant movement capability.

F. Tooling of Nonsag Sealants: Immediately after sealant application and before skinning or curing begins, tool sealants according to requirements specified in subparagraphs below to form smooth, uniform beads of configuration indicated; to eliminate air pockets; and to ensure contact and adhesion of sealant with sides of joint.

1. Remove excess sealant from surfaces adjacent to joints.
2. Provide concave joint profile per Figure 8A in ASTM C 1193, unless otherwise indicated.
3. Provide flush joint profile where indicated per Figure 8B in ASTM C 1193.
4. Provide recessed joint configuration of recess depth and at locations indicated per Figure 8C in ASTM C 1193.

    a. Use masking tape to protect surfaces adjacent to recessed tooled joints if needed..

3.4 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 1 test for each 250 feet of joint length thereafter or 1 test per each floor per elevation.

2. Test Method: Test joint sealants according to Method A, Field-Applied Sealant Joint Hand Pull Tab, in Appendix X1 in ASTM C 1193 or Method A, Tail Procedure, in ASTM C 1521.

    a. For joints with dissimilar substrates, verify adhesion to each substrate separately; extend cut along one side, verifying adhesion to opposite side. Repeat procedure for opposite side.

3. Inspect tested joints and report on the following:

    a. Whether sealants filled joint cavities and are free of voids.
    b. Whether sealant dimensions and configurations comply with specified requirements.
    c. Whether sealants in joints connected to pulled-out portion failed to adhere to joint substrates or tore cohesively. Include data on pull distance used to test each kind of product and joint substrate. Compare these results to determine if adhesion passes sealant manufacturer's field-adhesion hand-pull test criteria.

4. Record test results in a field-adhesion-test log. Include dates when sealants were installed, names of persons who installed sealants, test dates, test locations, whether joints were primed, adhesion results and percent elongations, sealant fill, sealant configuration, and sealant dimensions.
5. Repair sealants pulled from test area by applying new sealants following same procedures used originally to seal joints. Ensure that original sealant surfaces are clean and that new sealant contacts original sealant.

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.

3.5 CLEANING

A. Clean off excess sealant or sealant smears adjacent to joints as the Work progresses by methods and with cleaning materials approved in writing by manufacturers of joint sealants and of products in which joints occur.

3.6 PROTECTION

A. Protect joint sealants during and after curing period from contact with contaminating substances and from damage resulting from construction operations or other causes so sealants are without deterioration or damage at time of Substantial Completion. If, despite such protection, damage or deterioration occurs, cut out and remove damaged or deteriorated joint sealants immediately so installations with repaired areas are indistinguishable from original work.

3.7 JOINT-SEALANT SCHEDULE

A. Sealant Type:

1. S-2: Dymonic FC
2. S-3: Vulkem 45SSL
3. S-5: Spectrem 1

B. Joint-Sealant Application JS-1: Exterior vertical and horizontal non-traffic construction joints in cast-in-place concrete.

1. Joint Sealant: Single Component hybrid sealant S-2.
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

C. Joint Sealant Application JS-2: Horizontal traffic joints in cast-in-place concrete slabs and pre-cast architectural concrete units.

1. Joint Sealant: Single component pourable urethane sealant S-3.
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

D. Joint-Sealant Application JS-3: Exterior vertical joints between plant-precast architectural concrete units.

1. Joint Sealant: Single component hybrid sealant S-2.
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

E. Joint-Sealant Application JS-4: Exterior vertical control and expansion joints in unit masonry.

1. Joint Sealant: Single component hybrid sealant S-2.
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

F. Joint-Sealant Application JS-6: Exterior joints in exterior insulation and finish systems.

1. Joint Sealant: Single component Non-sag hybrid sealant S-2.
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

G. Joint-Sealant Application JS-7: Exterior butt joints between metal panels.

1. Joint Sealant: Single Component Neutral Cure Non Sag Silicone S-5.
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

H. Joint-Sealant Application JS-8: Exterior vertical joints between different materials listed above.

1. Joint Sealant: Single Component Neutral Cure Non Sag Silicone S-5.
2. Joint-Sealant Color: As selected by Architect from manufacturer's full range.

I. Joint-Sealant Application JS-10: Exterior perimeter joints between frames of doors, windows and louvers.

1. Joint Sealant: Single Component Neutral Cure Non Sag Silicone S-5.

2. Joint-Sealant Color: As selected by Architect from manufacturer's full range

END OF SECTION 079200

SECTION 081113 - HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes hollow-metal doors

B. Hollow metal frames

C. Acoustical rated doors

D. Hollow metal architectural stick systems

E. Related Requirements:
   1. Section 087100 "Door Hardware" for door hardware for hollow-metal doors.

1.3 DEFINITIONS

A. Minimum Thickness: Minimum thickness of base metal without coatings according to NAAMM-HMMA 803 or SDI A250.8.

B. ASTM - American Society for Testing and Materials

C. ASTM A 653/A 653M - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.

D. ASTM A 924 - Specification for General Requirements for Steel Sheet, Metallic Coated by the Hot Dip Process.

E. ASTM A 1008/A 1008M - Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, High Strength Low-Alloy, High Strength Low Alloy with Improved Formability, Solution Hardened, and Bake Hardened.

F. ASTM E 90-09 - Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions. (All doors tested shall be fully operable.)

G. ASTM E 413-10 - Classification for Rating Sound Insulation.

H. ANSI - American National Standards Institute

I. ANSI/DHI A115 - Specifications for Hardware Preparations in Standard Steel Doors and Frames.

J. ANSI/DHI A115.IG - Installation Guide for Doors and Hardware.

K. ANSI A156.7 - Hinge Template Dimensions.

L. ANSI A 250.3 - Test Procedure and Acceptance Criteria for Factory Applied Finish Painted Steel Surfaces for Steel Doors and Frames.

M. ANSI A250.4-2011 - Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcing.

N. ANSI A 250.8-2003 - SDI-100 Recommended Specifications for Standard Steel Doors and Frames.

O. ANSI A 250.10 - Test Procedure and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames.

P. ANSI/SDI 250.11-2012 - Recommended Erection Instructions for Steel Frames

Q. SDI - Steel Door Institute

R. SDI 105 - Recommended Erection Instructions for Steel frames.

S. SDI 111-09 - Recommended Details and Guidelines for Standard Steel Doors and Frames and Accessories.

T. SDI 112-08 - Zinc-Coated (Galvanized/Galvannealed) Standard Steel Doors and Frames.

U. SDI 113-13 -Standard Practice for Determining the Steady-State Thermal Transmission of Steel Door and Frame Assemblies

V. SDI 117-09 - Manufacturing Tolerances for Standard Steel Doors and Frames.

W. SDI 118-12 - Basic Fire Door Requirements.

X. SDI 122-07 - Installation and Troubleshooting Guide for Standard Steel Doors and Frames.

Y. SDI 124-11 - Maintenance of Standard Steel Doors and Frames.

Z. NAAMM/HMMA - Hollow Metal Manufacturers Association

AA. HMMA 840 - Guide Specification for Installation and Storage of Hollow Metal Doors and Frames

BB. HMMA 820 TN01 - Grouting Hollow Metal Frames

CC. HMMA 820 TN03 – Guidelines for Glazing of Hollow Metal Transom, Sidelight and Windows

DD. HMMA 840 TN01 - Painting Hollow Metal Products

EE. Building Code references

FF. NFPA 80 - Standard for Fire Doors and Other Opening Protectives.

GG. NFPA 101 – Life Safety Code

HH. IBC – International Building Code

II. NFPA 105 - Standard for the Installation of Smoke Door Assemblies and Other Opening Protectives

JJ. UL 1784 - Air Leakage Tests of Door Assemblies

KK. ANSI/ASA S12.60 – Acoustical Performance Criteria, Design Requirements, and Guidelines for Schools

LL. NFPA 252 – Standard Method of Fire Tests of Door Assemblies

MM. ANSI/UL 10C - Standard for Safety for Positive Pressure Fire Tests of Door Assemblies

NN. UL - Building Materials Directory; Underwriters Laboratories Inc

OO. WH - Certification Listings; Warnock Hersey International Inc.

1.4 REQUIREMENTS OF REGULATORY AGENCIES

A. Doors and frames: conform to applicable codes for fire ratings. It is the intent of this specification that doors and frames and its application comply or exceed the standards for labeled openings. In case of conflicts in required fire protection ratings, provide fire ratings as required by NFPA and UL.

B. Fire door assemblies in exit enclosures, stair enclosures and exit passageways are to have maximum transmitted temperature end point of not more than 250°F above ambient at the end of 30 minutes of the fire test.

C. Provide fire door assemblies where specified with temperature rise rating at exit enclosures, stair enclosures and exit passageways.

D. Provide an overlapping metal Z type astragal at pairs of cross corridor fire doors, opposite-swinging doors and double egress doors.

1.5 COORDINATION

A. Coordinate anchorage installation for hollow-metal frames. Furnish setting drawings, templates, and directions for installing anchorages, including sleeves, concrete inserts, anchor bolts, and items with integral anchors. Deliver such items to Project site in time for installation.

1.6 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.7 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include construction details, material descriptions, core descriptions, fire-resistance ratings, temperature-rise ratings, and finishes.

B. Submit for review six (6) complete copies of the hollow metal shop drawings covering complete details of items required for the project. Include manufacturer's names and identification of product. Include six (6) complete copies of technical data/product sheets and other pertinent data as required to indicate compliance with the specification. Four (4) of these copies are to be forwarded to the Architect for review.

C. Shop Drawings: Submit door and frame schedule using same reference designations indicated on Drawings. Include opening size(s), handing of doors, details of each frame type, elevations of door design types, location, hardware group numbers, details of splice connections, fire label requirements, temperature rise requirements, grout guard detail, hardware mounting locations, glass moldings, welding details, internal reinforcing and anchor

D. Data submitted shall be specific and shall include product data and printed information in sufficient detail and scope to verify compliance with requirements of the contract documents.

E. Shop drawings, product data, and samples: Contractor to stamp verifying they have been coordinated and reviewed for completeness and compliance with the contract documents.

F. Follow the same procedures for re-submittal as the initial submittal with the appropriate revised dates noted.

G. Provide evidence of manufacturer's membership in the Steel Door Institute.

H. Underwriters' Laboratories and Intertek Testing Services / Warnock Hersey, labeled fire doors and frames:
1. Label fire doors and frames listed in accordance with Underwriters Laboratories standard UL10C, and Positive Pressure Fire Tests of Door Assemblies.
2. Construct and install doors and frames in accordance with NFPA 80.
3. Manufacture fire rated doors under the UL or ITS/WH factory inspection program providing the degree of fire protection capability indicated by the door schedule drawings.
4. Provide metal labels permanently fastened to each fire door and fire door frame as evidence of compliance with procedures of the labeling agency. Mylar or stamped labels are not permitted.
5. Labels are not to be removed, defaced or made illegible while the door is in service per NFPA 80.

6. Labels applied to frames are not to be prime painted from the factory and are to be furnished with a paint mask to protect the label during the field painting process.
7. Door and frame labels are not to be primed or painted. The Contractor shall be responsible for all costs incurred to clean labels.
8. Apply labels in locations that are clearly visible and convenient for identification by the AHJ and the Owner after installation.
9. Fire doors and frames provided with continuous hinges shall have the physical label for the frame located on the rabbet of the head jamb and on the top channel of the door.

I. Oversize Fire Rated Door Assemblies: For units exceeding sizes of tested assemblies, provide certification by a testing agency acceptable to authorities having jurisdiction that each door and frame assembly has been constructed to comply with design, materials, and construction equivalent to requirements for labeled construction.

J. Sustainable Design Submittals:

K. Refer to Section 01 8113 for sustainable design submittal requirements.

L. Shop Drawings: Include the following:

1. Elevations of each door type.
2. Details of doors, including vertical- and horizontal-edge details and metal thicknesses.
3. Frame details for each frame type, including dimensioned profiles and metal thicknesses.
4. Locations of reinforcement and preparations for hardware.
5. Details of each different wall opening condition.
6. Details of anchorages, joints, field splices, and connections.
7. Details of accessories.
8. Details of moldings, removable stops, and glazing.
9. Details of conduit and preparations for power, signal, and control systems.

M. Samples for Initial Selection: For units with factory-applied color finishes.

N. Samples for Verification:

1. For each type of exposed finish required, prepared on Samples of not less than 3 by 5 inches (75 by 127 mm).
2. For "Doors" and "Frames" subparagraphs below, prepare Samples approximately 12 by 12 inches (305 by 305 mm) to demonstrate compliance with requirements for quality of materials and construction:

    a. Doors: Show vertical-edge, top, and bottom construction; core construction; and hinge and other applied hardware reinforcement. Include separate section showing glazing if applicable.
    b. Frames: Show profile, corner joint, floor and wall anchors, and silencers. Include separate section showing fixed hollow-metal panels and glazing if applicable.

O. Schedule: Provide a schedule of hollow-metal work prepared by or under the supervision of supplier, using same reference numbers for details and openings as those on Drawings. Coordinate with final Door Hardware Schedule.

1.8 INFORMATIONAL SUBMITTALS

A. Product Test Reports: For each type of hollow-metal door and frame assembly, for tests performed by a qualified testing agency.

B. Oversize Construction Certification: For assemblies required to be fire rated and exceeding limitations of labeled assemblies.

1.9 COORDINATION

A. Coordinate Work with other sections involving manufacture or fabrication of internal cutouts and reinforcement for door hardware and electrified items.

B. Coordinate door undercuts with architect's details and specified hardware under Section 087100. Interior doors to be 3/8" undercut unless otherwise indicated.

C. Factory prep hollow metal frames at exterior openings to receive Raco security box. Refer to security drawings for details, diagrams and locations.

D. Prior to bidding the work, the supplier shall field verify existing door opening conditions where existing doors or frames are to remain or be replaced in part, for coordination with the specified hardware and notify the Contractor and Architect of conflicts prior to proceeding. Failure to notify the Contractor and Architect of conflicts that result in additional work or material is the responsibility of the hollow metal supplier, with no cost to the owner.

E. Field dimensions need to be verified and approved prior to fabrication.

F. The supplier shall be responsible for proper coordination, templating, dimensions and all details required for doors, frames and hardware application

1.10 DELIVERY, STORAGE, AND HANDLING

A. Deliver hollow-metal work palletized, packaged, or crated to provide protection during transit and Project-site storage. Do not use nonvented plastic.

1. Provide additional protection to prevent damage to factory-finished units.

B. Deliver welded frames with two removable spreader bars across bottom of frames, tack welded to jambs and mullions.

C. Store hollow-metal work vertically under cover at Project site with head up. Place on minimum 4-inch- (102-mm-) high wood blocking. Provide minimum 1/4-inch (6-mm) space between each stacked door to permit air circulation.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Acceptable manufacturers for doors and frames specified are listed below. Only the products of the listed manufacturers will be accepted. No other alternates will be accepted.
   1. Steelcraft, Cincinnati, Ohio
   2. Ceco, Milan, Tennessee
   3. Metal Products, Inc., Corbin, Kentucky

B. The manufacturers listed are acceptable providing they adhere to the quality standards as noted herein. Special door construction shall supersede the manufacturers and/or industry standard. Products that do not comply with these special requirements or special construction shall be rejected.

C. Provide steel doors and frames from a single manufacturer.

D. Source Limitations: Obtain hollow-metal work from single source from single manufacturer.

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 and temperature-rise limits 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/INTERIOR DOORS

A. Construct interior doors and frames to comply with the standards indicated for materials, fabrication, hardware locations, hardware reinforcement, tolerances, and clearances, and as specified.

B. Construct exterior/interior doors to these designs and gages:
   1. Exterior Doors: Zinc-Iron Alloy-Coated galvannealed steel, ASTM A 653, Class A60, 16 gage [0.053" (1.3mm)], with closed tops.
      a. Include galvannealed components and internal reinforcements with galvannealed doors.

b. Close tops on all exterior doors with minimum 16 gage galvannealed steel top caps.
c. Provide weep-holes in bottom of doors to permit entrapped moisture to escape.
d. Coordinate door mid-rail location with mounting height of exit device per Section 087100.
    1) Interior Doors: Cold-rolled steel, A 1008, 18 gage [0.042” (1mm)], cold rolled steel.
    2) Factory prime painted doors are indicated on door schedule as HM.
    3) Hardware Reinforcements:
e. Hinge reinforcements for full mortise hinges: minimum 7 gage [0.180" (4.7mm)].
f. Lock reinforcements: minimum 16 gage [0.053" (1.3mm)].
g. Closer reinforcements: minimum 14 gage [0.067" (1.7mm)].
h. Galvannealed doors: include galvannealed hardware reinforcements.
i. Projection welded hinge and lock reinforcements to the edge of the door.
j. Provided adequate reinforcements for other hardware as required.
    1) Glass moldings and stops (both labeled and non-labeled doors):
k. Fabricate glass trim from 24 gage [.6mm] steel conforming to:
    1) ASTM designation A 924 Zinc-Iron Alloy-Coated galvannealed steel (A60) at exterior openings.
    2) ASTM designation A 366 cold rolled steel at interior openings
l. Install glass trim into the door as a four sided welded assembly identical on both sides of the door with mitered, reinforced and welded corners. Provide same trim for both fire rated and non-fire rated doors.
m. Exposed fasteners are not permitted.
n. Acceptable mounting methods:
    1) Fit into a formed area of the door face, not extending beyond the door face, and interlocking into the recessed area
    2) Cap the cutout not extend more than 1/16” [1.6mm] from the door face.

C. Full Flush Type Doors Construction
1. Doors shall have been tested and certified meeting ANSI-A250.
2. Approved door core constructions:
    a. Honeycomb Core: Reinforced, stiffened, sound deadened and insulated with impregnated Kraft honeycomb core completely filling the inside of the doors and laminated to inside faces of both panels with contact adhesive applied to both panels. INTERIOR
    b. Polystyrene Core: Reinforced, stiffened, sound deadened and insulated with a rigid closed cell polystyrene core bonded to the inside faces of both panels. Core shall meet the requirements of ASTM C578. EXTERIOR

D. Electrical Requirements:
1. General: Make provisions for installation of electrical items specified elsewhere.
2. Provide all cutouts and reinforcements required for Hollow Metal doors to accept electrical door hardware and security system components.

2.4 EXTERIOR/INTERIOR FRAMES

A. Flush Frames: set-up and welded with temporary spreader bars. Factory die-mitered corner connections reinforced with four integral tabs to secure and interlock at jambs to head. Unless otherwise indicated, frame will have 2" faces and 5/8" stops. Frame depths per the architectural door schedule.
   1. Provide frames with a minimum of six wall anchors and two adjustable base anchors of manufacturer's standard design. Furnish anchors to meet wall conditions.
   2. Acceptable products:
      a. Steelcraft
      b. Ceco
      c. Metal Products, Inc.
   3. Provide welded 3 sided frames:
      a. Face welded: Weld miter joints between head and jamb faces completely along their length either internally or externally. The remaining elements of the frame profile (soffit, stop and rabbets) are not welded unless otherwise specified. Grind and finish face joints smooth.
   4. All frames in walls eight (8) inches or less shall be wrap around type frames.
      a. Weld-in base anchor attaching plate in each jamb for field installation of loose base anchors to allow proper anchoring at base of frame.
   5. Prepare frames to receive field inserted type door silencers (3) per strike jamb on single doors, and (2) per head for pair of doors. Stick-on silencers are not permitted.

B. Construct exterior and metal door frames to these profiles, designs and gages;
   1. Exterior Frames: Zinc-Iron Alloy-Coated galvannealed steel, ASTM A 653, Class A60, 14 gage [0.067" (1.7mm)].
   2. Interior Frames in Masonry: Zinc-Iron Alloy-Coated galvannealed steel, ASTM A 653, Class A60, 16 gage [0.053" (1.3mm)] galvannealed steel.
   3. Include galvannealed components and internal reinforcements with galvannealed frames.
   4. Interior Frames in stud wall construction: 16 gage [0.053" (1.3mm)] cold rolled steel frames.

C. Frame Hardware Reinforcements:
   1. Mortise hinge reinforcement: minimum 7 gage [0.180" (4.7mm)].
   2. Provide high frequency full mortise hinge reinforcement for top hinge in accordance with SDI 111-H, Example "A" Application on all frames for doors 3'4" and greater.
   3. Strike reinforcements: minimum 16 gage [0.053" (1.3mm)] and prepared for an ANSI-A115.1-2 strike.
   4. Closer reinforcement: minimum 14 gage [0.067" (1.7mm)] steel.
   5. Provide head reinforcement for frames 48 inches or wider in masonry wall openings with a continuous full length 12 gauge flat steel reinforcement piece welded to inside of rabbet stop. Head reinforcing shall not be used as a lintel or load-bearing member for masonry.

D. Projection weld hinge and strike reinforcements to the door frame.

E. Provide metal plaster guards for all mortised cutouts.

F. Provide adequate reinforcements for other hardware as required.

G. Include galvanized hardware reinforcements in all galvannealed frames.

H. Provide grout guard cover boxes at all grouted frames that are to receive continuous hinges.
   1. Grout guards shall be full height, 18 gage, galvanized, welded in door rabbet, ¾" depth with top and bottom capped. Provide detail.

I. Electrical Requirements:
   1. General: Coordination all electrical requirements for doors and frames.
   2. Provide cutouts and reinforcements required for metal door frames to receive electrical hardware and security components.
   3. Provide welded UL listed junction back boxes with metal conduit or raceway to permit wiring from electrical door hardware.
   4. All junction /grout guard cover boxes are to be caulked by installation contractor.
   5. Refer to 087100 for electrified hardware.

J. Provide mortar box, welded in head of door frame at exterior frames for future door contact switch provided by Owner. Coordinate type, location and conduit requirements provided by Owner.

2.5 CONSTRUCTION OF ARCHITECTURAL STICK COMPONENTS

A. Fabricate architectural stick frame assemblies from standard frame components, fabricated from 14 gage galvannealed steel A60 for exterior, and 16 gage cold rolled steel for interior.

B. Construct architectural stick frame assemblies of standard frame components, fabricated as specified.
   1. Exterior Frames: Zinc-Iron Alloy-Coated galvannealed steel, ASTM A 653, Class A60, 14 gage [0.067" (1.7mm)].
   2. Interior Frames in Masonry: Zinc-Iron Alloy-Coated galvannealed steel, ASTM A 653, Class A60, 16 gage [0.053" (1.3mm)] galvannealed steel.
   3. Include galvannealed components and internal reinforcements with galvannealed frames.
   4. Interior Frames in stud wall construction: 16 gage [0.053" (1.3mm)] cold rolled steel frames.

C. Frame component requirements:
   1. Prepare required components at door openings and frame assemblies for specified hardware.
   2. Fabricate frame assemblies from three basic components:
      a. Open Sections (perimeter members) identical in configuration to standard frames
      b. Closed sections (intermediate members) with identical jamb depth, face dimensions, and stops as open sections.
      c. Sill sections: Fabricated from galvanized steel, flush with both faces of adjacent vertical members. Cut individual components to length and notched to assure square joints and corners.

1) Externally welded face joints at meeting mullions or between mullions and other frame members on the face surfaces only. Grind and finish face joints smooth.
2) Ship frame assemblies to the jobsite completely welded. Field splice joints permissible only when the size of the total assembly exceeds shipping limitations. Fabricate oversized frames in sections designated for splicing in the field. Provide frames with joint reinforcements 14 gage, 8" long. Field weld joint reinforcement inside and tack weld outside joint at both faces, grind, and finish smooth and uniform in appearance, after installation. Frames fabricated from galvanized steel, use zinc rich rust inhibitive primer.

3. All frame glass stops are to be furnished with manufacturers' standard fasteners.
4. Provide necessary anchors for jambs, heads, and sills of assemblies.

2.6 FABRICATION

A. Face Welded Frames:
1. Continuous face weld the joint between the head and jamb faces along their length either internally or externally. Grind, prime paint, and finish smooth face joints with no visible face seams.
2. Externally weld, grind, prime paint, and finish smooth face joints at meeting mullions or between mullions and other frame members per ANSI/SDI A250.8.
3. Provide two (2) temporary steel spreaders welded to the jambs at each rabbet of door openings on welded frames during shipment and handling. Remove temporary steel spreaders prior to installation of the frame.

2.7 FINISH

A. Doors, frames and frame components are required to be cleaned, phosphatized, and finished with one coat of baked-on rust inhibiting prime paint in accordance with the ANSI/SDI A250.10 "Test Procedures and Acceptance Criteria for Prime Painted Steel Surfaces for Steel Doors and Frames."
1.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine roughing-in for embedded and built-in anchors to verify actual locations before frame installation.

C. Prepare written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

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

3.2 PREPARATION

A. Remove welded-in shipping spreaders installed at factory. Restore exposed finish by grinding, filling, and dressing, as required to make repaired area smooth, flush, and invisible on exposed faces.

B. Drill and tap doors and frames to receive nontemplated, mortised, and surface-mounted door hardware.

3.3 INSTALLATION

A. Install doors and frames in accordance with Steel Door Institute’s recommended erection instructions for steel frames ANSI A250.11-2012.

B. General: Install hollow-metal work plumb, rigid, properly aligned, and securely fastened in place. Comply with Drawings and manufacturer's written instructions.

C. 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. Metal-Stud Partitions: Solidly pack mineral-fiber insulation inside frames.

4. Masonry Walls: Coordinate installation of frames to allow for solidly filling space between frames and masonry with grout.
5. Concrete Walls: Solidly fill space between frames and concrete with mineral-fiber insulation.
6. In-Place Concrete or Masonry Construction: Secure frames in place with postinstalled expansion anchors. Countersink anchors, and fill and make smooth, flush, and invisible on exposed faces.
7. In-Place Metal or Wood-Stud Partitions: Secure slip-on drywall frames in place according to manufacturer's written instructions.
8. 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.

D. 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: 3/4 inch (19.1 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.

E. Glazing: Comply with installation requirements in Section 088000 "Glazing" and with hollow-metal manufacturer's written instructions.

1. Secure stops with countersunk flat- or oval-head machine screws spaced uniformly not more than 9 inches (230 mm) o.c. and not more than 2 inches (51 mm) o.c. from each corner.

3.4 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. Fire Door Assembly Inspection and Testing: Upon completion of the installation, provide functional testing and inspection of each fire door assembly on the project to confirm proper operation and that it meets all criteria of a fire door assembly as per NFPA 80, 5.2 - Inspection and Testing, 2013 edition. Inspections shall be performed by individuals with knowledge and understanding of the operating components of the door being subjected to testing and who are certified by Intertek as a Fire Door Assembly Inspector (FDAI) or a credentialed Architectural Hardware Consultant (AHC). A written report using reporting forms provided by the Door and Hardware Institute shall be maintained and transmitted to the Owner and made available to the Authority Having Jurisdiction (AHJ). The report shall list each fire door throughout the project, and include each door number, location, hardware set used and summary of deficiencies.
   1. Schedule fire door assembly inspection within 90 days of Substantial Completion of the Project.
   2. Contractor shall correct all deficiencies and schedule a re-inspection of fire door assemblies which were noted as deficient on the inspection report. All deficiencies must be repaired without delay.
   3. Additional re-inspections which are required due to incomplete repairs will be performed by the inspector at the expense of the Contractor.

C. Remove grout and other bonding material from hollow-metal work immediately after installation.

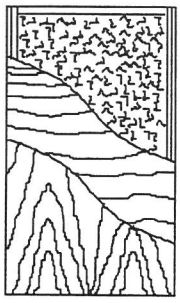
D. Prime-Coat Touchup: Immediately after erection, sand smooth rusted or damaged areas of prime coat and apply touchup of compatible air-drying, rust-inhibitive primer.

E. Metallic-Coated Surface Touchup: Clean abraded areas and repair with galvanizing repair paint according to manufacturer's written instructions.

F. Factory-Finish Touchup: Clean abraded areas and repair with same material used for factory finish according to manufacturer's written instructions.

G. Touchup Painting: Cleaning and touchup painting of abraded areas of paint are specified in painting Sections.

END OF SECTION 081113



OSHKOSH
ARCHITECTURAL DOOR COMPANY

5 PLY PARTICLEBOARD CORE WITH VENEER FACE

GP5V

SPECIFICATIONS

Standards (meet or exceed)	AWI Section 1300 PC5, NWWDA IS-1A, WIC Section 20
Maximum sizes	4-0 X 10-0 single 8-0 X 10-0 regular or DE pair
Thickness	1 3/4" or 1 3/8" (max size 1 3/8" 3-0 X 7-0 & 6-0 X 7-0 pair)
Core	Particleboard complies with ANSI A208.1 grade 1- LD-2 (32 lb.)
Stiles	1 3/8" minimum 2ply , outer ply matching hardwood , compatible hardwood, or veneered.
Top & Bottom Rails	1 1/8" min.hardwood or SCL (structural composite lumber) mill option
Core Assembly Adhesive	Stiles and rails bonded to core with Type II
Face Assembly / Adhesive	Faces & crossbands hot-pressed to core with Type I glue
Crossband	Engineered wood product
Faces	Any commercially available veneer or medium density overlay
Labeling	20 Min. 1 3/4" thick doors in singles or pairs. Subject to ASTM E-152 and Intertek Testing Services (Warnock Hersey)
Special Details	Machining for templated hardware, lights, louvers, dutch doors, Special blocking & applied moldings. Refer to specific technical sheets for details and limitations. (Louvers not allowed in 20 min.)
Factory Finish	UV finish in standard & custom match colors Meets or exceeds AWI TR6
Acoustic Rating	STC 31 (operable unit) When installed with appropriate gasketing 1 3/4" only
Warranty	Full Door Warranty for Life of Installation on interior applications. *Warranty does not cover exterior applications or the appearance high gloss finishes or field finishes. See complete warranty for details.*

Oshkosh Architectural Door Co. reserves the right to change design and/or details of its products without notice.

OSHKOSH
ARCHITECTURAL DOOR COMPANY

FULL DOOR WARRANTY

OSHKOSH ARCHITECTURAL warrants all of its doors set forth herein to be of good material and workmanship and to be free of defects which would render said doors unserviceable or unfit for their ordinary, recommended use for the designated time period; except as otherwise set forth in this full door warranty.

OSHKOSH ARCHITECTURAL shall have no liability under this warranty or under any implied warranties unless such doors have been handled, stored, finished, installed and maintained in accordance with "HANDLING, JOB FINISHING AND INSTALLATION INSTRUCTIONS."

Any claims in connection with our warranty must be submitted in writing upon discovery. All doors must be inspected prior to installation, and installations of pre-finished doors shall constitute acceptance as to door pre-finish.

Any **OSHKOSH ARCHITECTURAL** door claimed to be defective within the meaning of this warranty PRIOR TO INSTALLATION MUST FIRST BE CHECKED BY AN AUTHORIZED REPRESENTATIVE OF THE COMPANY.

If a claim for defective merchandise is found to be valid within the meaning of this warranty, **OSHKOSH ARCHITECTURAL** will either (1) repair it or (2) replace with an identical unit, or (3) refund the purchase price, at the option of **OSHKOSH ARCHITECTURAL**. No liability whatsoever shall attach until the door(s) involved have been paid for in full.

If any door BECOMES DEFECTIVE AFTER INSTALLATION within the meaning of this warranty and particularly with regard to the manufacturer's provisions as included herein under the paragraph entitled "TOLERANCES", and after an inspection by an authorized company representative, **OSHKOSH ARCHITECTURAL** agrees in addition to the above, to pay reasonable expenses for removing, re-hanging, and refinishing the defective doors. Such removal, re-hanging, and refinishing, shall be performed only with the express written approval of an **OSHKOSH ARCHITECTURAL** corporate officer AND only after the cost of such work has been determined. If the defect for which the door is being rejected was visible and apparent PRIOR TO HANGING, **OSHKOSH ARCHITECTURAL** shall not be responsible for such costs of removing, re-hanging, and refinishing, of said doors.

DURATION OF WARRANTY

DOOR SERIES	INTERIOR USE	EXTERIOR USE
GP5 PARTICLE	Life of installation	No Warranty
GS5 STAVE	Life of installation	No Warranty
GT5 ENGINEERED	Life of installation	1 Year
GA ACOUSTICAL	Life of installation	No warranty
GL LEAD LINED	Life of installation	No warranty
GF C&B LABELED	Life of installation	No warranty
NH HOLLOW CORE	1 Year	No warranty
*GPS PARTICLE	Life of installation	No warranty

All time periods commence as of factory ship date.

*NOTE: GPS warranty for Life of installation only valid when authorized by signature of company representative.

By: _____

Oshkosh Architectural Door Company

CONDITIONS AND EXCEPTIONS

Under no circumstances will **OSHKOSH ARCHITECTURAL** be liable for the following: (a) Failures not reported within the applicable warranty period; (b) Failures or damage due to accidents, abnormal conditions of temperature or moisture, or negligence, abuse or improper installation; (c) Losses, costs, expenses, liabilities, and damages, including but without limitation to, loss of use or profits, damage to persons or property, and all other special or consequential damages, whether direct or indirect. (d) Any costs etc. incurred from finishing or hanging of a known defective product.

TOLERANCES

1. Size tolerance: thickness ± 1/16", length ± 1/8", standard widths ± 1/16", prefit widths ± 1/32".
2. Squareness tolerance: diagonal measurement difference shall not exceed 1/8".
3. Factory hardware preparation tolerance: a plus or minus 1/32" tolerance will be allowed on hinge preparation cutouts. A plus 1/32" minus 0" tolerance will be allowed on lock front preparation cutouts.
4. Stile, rail and core show-through (photographing) on flush doors shall not be considered a defect unless the faces of the door vary from a true plane in excess of 1/100" in any 3" span.
5. Warp shall not be considered a defect unless it exceeds 1/4" in the plane of the door itself.

For doors 1-3/4" or thicker, warp shall not exceed 1/4" in doors 3/6 x 7/0 or smaller, nor shall it exceed 1/4" in any 3/6 x 7/0 section of larger doors. For doors less than 1-3/4" thick, warp shall not exceed 1/4' in doors 3/0 x 7/0 or smaller.

"Warp" is any distortion in the door itself and does not refer to the relationship of the door to the frame or jamb in which it is hung. The term "warp" shall include bow, cup and twist. In measuring the amount of warp present in a door, the following method shall be used; bow, cup and twist shall be measured by placing a straight edge, taut wire or string on the suspected concave face of the door at any angle (i.e., horizontally, vertically, diagonally) with the door in its installed position. The measurement of the bow, cup and twist shall be made at the point of maximum distance between the bottom of the straight edge, taut wire or string and the face of the door.

OSHKOSH ARCHITECTURAL shall have the option to allow any warped or photographing doors to "hang" one (1) full year after date of claim, in order that they may "acclimate" to their interior environment.

6. Exterior doors, otherwise subject to this full warranty, will not be guaranteed against photographing or warping if they are supplied for use outside the continental 48 states.

ADDITIONAL EXCLUSIONS

1. There is no warranty of the appearance of field finished doors.
2. Natural variations in the color or texture of wood are not defects.
3. The warranty against warp does not apply to the following:
   a. Doors 1-3/8" thick which are wider than 3/0 or higher than 7/0.
   b. Any door with face veneers of different species on each side.
   c. Any door that is hung improperly or does not swing freely, ie binding on hinges, dragging on frame or threshold.

4. This warranty does not cover:
   a. Flush doors with cutouts for lights and/or louvers, any edge of which is nearer than 5" to any edge of the door.
   b. Flush doors with cutout areas exceeding 40% of the area of the face of the door or exceeding 1/2 the height of the door except GT series for interior use.
   c. All doors having less than 5" between cutouts for lights (flush doors) unit locks, closers and/or other hardware cutouts except GT series.
   d. Interior GT series door over 8-0 full glass cutouts
   e. Any delamination caused by failure to protect and seal all exposed surfaces of the door and the continued proper maintenance of these surfaces.
   f. The appearance of high gloss plastic, paint, or transparent finished doors.
   g. Cracking of laminate around light openings cut by others
   h. Doors 7-2' and under with less than 3 hinges or pivots and doors over 7-2" with less than 4 hinges or pivots.
   i. Doors with concealed closers or holders deeper than 2" or thicker than 1 1/8".
   j. Repairs or replacements made without prior written consent from manufacturer
   k. Normal wear and tear including wear through of the finish, or doors deteriorating for reasons other than material and workmanship of the door itself.
   l. Exterior doors:
      1. If concealed closers or holders are used.
      2. Unless edges exposed for openings and hardware are doubled sealed with exterior sealer.
      3. Unless exterior lip moldings are used at view windows and flashing is installed at top of doors which swing out.
      4. Unless adequate overhang protection is provided to prevent direct exposure to the elements i.e., sun and rain.
      5. With plastic laminate faces.

HANDLING, JOB FINISHING AND INSTALLATION INSTRUCTIONS.

1. Deliver door(s) to building site after plaster or cement is dry. If doors are stored at job site for more than one week, all edges should be sealed.
2. Handle with clean gloves and do not drag doors across one another or across other surfaces.
3. Store flat on a level surface in a dry, well-ventilated building. Cover to keep clean but allow circulation. Relative humidity should not be less than 30% or greater than 60%.
4. Door should not be subjected to: abnormal heat, extreme dryness, humid conditions or sudden changes therein. They should be conditioned to average prevailing relative humidity of the locality before hanging
5. The utility or structural strength of the door must not be impaired in the fitting of the door, the application of hardware, or cutting and altering the door for lights, louvers, panels or any other special details.
6. Doors should be fitted with 1/8" clearance at head and each side.
7. When vision lights, louvers, hardware and etc. are installed in exterior doors, appropriate sealant should be used to insure no moisture penetration to the core. Flashing must be installed on the top of out swinging doors.
8. Before finishing, remove handling marks or effects of exposure to moisture with a through final sanding over all surfaces of the door using 100 to 150 grit sandpaper and clean before applying sealer or finish otherwise a blotchy appearance may result. Sanding and finishing should be done in a horizontal position. Some species of wood contain an chemical (oak particularly) which reacts unfavorable with certain finishes. Where possible, the surface should be tested for such unfavorable reactions. Application of a sealer before finishing will usually prevent this difficulty. The full beauty of wood is best emphasized by the use of a satin or semi-gloss finish, rather than high gloss. For spray application of paint on paint grade surfaces, additional preparation of the surface may be required.
9. Immediately after fitting, or cutting for any and all hardware, weather-strip and/or threshold, and before hanging any interior or exterior door on the job, the entire door, including the top and bottom edges, must receive an application of primer or sealer and two coats of a good grade paint, varnish or lacquer. Adequate drying time must be allowed between coats. For job site finishing, do not use a water thinned paint unless an oil base prime coat is first applied. Exterior finishes shall be used on the exterior face and all edges of exterior doors.
10. Dark colored finishes should be avoided on exterior surfaces of exterior doors.
11. Doors factory finished at the factory should be compared with the approved finish sample before hanging.

Installation of factory finished doors shall constitute acceptance.

THE ABOVE WARRANTY PROVISIONS ARE EXCLUSIVE AN IN LIEU OF ALL OTHER WARRANTIES EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE OR ANY OTHER WARRANTY OF MERCHANTABILITY.

Purchaser _____

Name of Installation _____

Address _____

City, _____ State & Zip _____

Order No. _____ Date Shipped _____

Date Installed _____ No. Of Doors _____

By: _____

Oshkosh Architectural Door Company

OSHKOSH
ARCHITECTURAL DOOR COMPANY
Oshkosh, Wisconsin 920-233-6161

Project Name _____

Location _____

Date _____ **Job #** _____ **Page** _____ **of** _____

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OSHKOSH
ARCHITECTURAL DOOR COMPANY

STORAGE, HANDLING AND INSTALLATION INSTRUCTIONS

STORAGE AND HANDLING

- DOORS SHALL ALWAYS BE STORED FLAT, OFF OF THE FLOOR WITH BOTTOM DOOR BEING SUPPORTED EVERY 24 INCHES IN CLEAN, DRY SURROUNDINGS. PROTECT FROM DIRT, WATER AND ABUSE. IF NOT FACTORY SEALED TOP AND BOTTOM, AND DOORS ARE TO BE STORED FOR LONG PERIODS, DOORS MUST BE SEALED NOT LATER THAN ONE WEEK AFTER RECEIPT WITH A NON-WATER BASED SEALER. THE BEST WAY TO STORE IS TO KEEP DOORS ON ORIGINAL SHIPPING PALLET WITH ALL PACKING INTACT.
- TRIMMED EDGES MUST BE IMMEDIATELY RESEALED.
- DOORS SHALL NOT BE EXPOSED TO EXCESSIVE MOISTURE, HEAT, DRYNESS, DIRECT SUNLIGHT OR WHERE HEATING AND/OR AIR CONDITIONING DUCTS WILL BLOW DIRECTLY ON THEM. RELATIVE HUMIDITY SHOULD NOT BE LESS THAN 30% OR GREATER THAN 60%.
- DOORS SHALL ALWAYS BE HANDLED WITH CLEAN HANDS OR WHILE WEARING CLEAN GLOVES. BARE HANDS LEAVE FINGER MARKS AND SOIL STAINS.
- ALWAYS KEEP POLY BAG ON PREFINISHED DOORS UNTIL THEY ARE READY TO HANG.
- **DOORS PREFINISHED AT THE FACTORY MUST BE COMPARED WITH THE APPROVED FINISH SAMPLE BEFORE HANGING. OSHKOSH WILL NOT BE LIABLE IF DOOR IS REJECTED FOR COLOR AFTER IT IS INSTALLED.**

INSTALLATION INSTRUCTIONS, GENERAL

- THE INTENDED SERVICE OR STRUCTURAL STRENGTH OF THE DOORS MUST NOT BE IMPAIRED BY FITTING TO THE OPENING, BY APPLYING HARDWARE, BY PREPARING FOR LIGHTS, LOUVERS, OR PLANTONS OR BY OTHER DETAILING.
- USE A MINIMUM OF ONE HINGE FOR EACH 30 INCHES OF DOOR HEIGHT. WHEN USING THREE OR MORE HINGES, FOLLOW THE MANUFACTURERS STANDARD HINGE SPACING.
- CLEARANCES BETWEEN DOOR EDGES AND DOOR FRAMES SHALL BE A NOMINAL 1/8 INCH. THIS INCLUDES THE HINGE EDGE, LOCK EDGE, AND THE TOP EDGE (HEAD) OF THE DOOR.
- ALL HARDWARE LOCATIONS, PREPARATIONS FOR HARDWARE AND METHODS OF HARDWARE ATTACHMENT MUST BE APPROPRIATE FOR THE DOOR CONSTRUCTION. TEMPLATES FOR SPECIFIC HARDWARE PREPARATIONS ARE AVAILABLE FORM HARDWARE MANUFACTURERS.

45, 60, 90 MINUTE FIRE DOORS, ADDITIONAL INSTALLATION INSTRUCTIONS

THESE ADDITIONAL INSTRUCTIONS SHOULD BE FOLLOWED TO ASSURE SATISFACTORY SERVICE FROM THE PRODUCT.

- NO MACHINING FOR HARDWARE MAY BE DONE OUTSIDE A LABELING SERVICE APPROVED SHOP EXCEPT FOR LOCK FUNCTION HOLES AND VIEWER PREPS NOT EXCEEDING 1" IN DIAMETER.
- NO TRIMMING OF DOOR WIDTH ALLOWED.
- TRIM FOR HEIGHT ON BOTTOM ONLY AND NOT MORE THAN 3/4 INCH...FROM NON-COMBUSTIBLE FLOOR.
- METAL LABEL MUST REMAIN ON DOOR HINGE EDGE. INSTALL DOOR WITH LABEL ON HINGE, NEAR TOP.
- IF INSTALLED WITH MORTISE HINGES, USE NO. 12 BY 1-1/4 INCH THREADED-TO-THE-HEAD STEEL SCREWS WITH CONSTANT DIAMETER WOOD THREADS. ALWAYS DRILL 5/32 INCH DIAMETER PILOT HOLES FOR NO. 12 SCREWS. PILOT HOLES SHOULD BE DRILLED THROUGH THE STILE, TO THE CORE.
- IF INSTALLED WITH SURFACE HINGES, ATTACH WITH STEEL THROUGH BOLTS.
- INSTALL LOCKS OR LATCHES USING NOT LESS THAN NO. 8 THREADED-TO-THE-HEAD STEEL SCREWS WITH CONSTANT DIAMETER WOOD THREADS. ALWAYS DRILL 1/8 INCH DIAMETER PILOT HOLES FOR NO. 8 SCREWS.

FAILURE TO DRILL **CORRECT** SIZE PILOT HOLES COULD RESULT IN UNSATISFACTORY ATTACHMENT.

IF FIELD INSPECTIONS BY OSHKOSH ARE REQUIRED, AND OSHKOSH FINDS IT IS NOT OUR ERROR, THE INSPECTION EXPENSES WILL BE CHARGED TO THE DISTRIBUTOR OR THE GENERAL CONTRACTOR AS APPROPRIATE.

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Insulated Sectional Overhead Doors.

B. Steel Sectional Overhead Doors.

C. Glazed Aluminum Sectional Overhead Doors

D. Electric Operators and Controls.

E. Operating Hardware, tracks, and support.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-In-Place Concrete: Prepared opening in concrete. Execution requirements for placement of anchors in concrete wall construction.

B. Section 04810 - Unit Masonry Assemblies: Prepared opening in masonry. Execution requirements for placement of anchors in masonry wall construction.

C. Section 05500 - Metal Fabrications: Steel frame and supports.

D. Section 07900 - Joint Sealers: Perimeter sealant and backup materials.

E. Section 08710 - Door Hardware: Cylinder locks.

F. Section 09900 - Paints and Coatings: Field painting.

G. Section 16130 - Raceway and Boxes: Empty conduit from control station to door operator.

H. Section 16150 - Wiring Connections: Electrical service to door operator.

1.3 REFERENCES

A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

B. ASTM A 123 – Zinc hot-dipped galvanized coatings on iron and steel products.

C. ASTM A 216 - Specifications for sectional overhead type doors.

D. ASTM A 229 - Steel wire, oil-tempered for mechanical springs.

E. ASTM A 653 - Steel sheet, zinc-coated galvanized by the hot-dipped process, commercial quality.

F. ASTM D 1929 - Ignition temperature test to determine flash and ignition temperature of foamed plastics.

G. ASTM E 84 - Tunnel test for flame spread and smoke developed index.

H. ASTM E 330 - Structural performance of exterior windows, curtain walls, and doors by uniform static air pressure difference.

I. ASTM E 413 - Classification for Rating Sound Insulation

J. ASTM E 1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation.

K. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
1. Refer to structural drawings.

B. Wiring Connections: Requirements for electrical characteristics.
1. Refer to Electrical Drawings.

C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Operation and Maintenance Data.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened labeled packaging until ready for installation.

B. Protect materials from exposure to moisture until ready for installation.

C. Store materials in a dry, ventilated weathertight location.

1.8 PROJECT CONDITIONS

A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1.9 WARRANTY

A. Warranty: Manufacturer’s limited door and operators System warranty for 10 years against cracking, splitting or deterioration of steel skin due to rust.

B. Warranty: Manufacturer’s limited door and operators System warranty for 8 years against cracking, splitting or deterioration due to rust-through.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Wayne Dalton; 2501 S. State Highway 121 Business, Suite 200, Lewisville, TX 75067. ASD. Phone: (800) 827-3667; Web Site: www.wayne-dalton.com. Email: info@wayne-dalton.com.

B. Substitutions: Or Equivalent approved by Architect and Owner.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 INSULATED SECTIONAL OVERHEAD DOORS

A. Insulated Steel Sectional Overhead Doors: Wayne Dalton Thermospan 200 insulated sectional overhead steel doors. Units shall have the following characteristics:
1. Door Sections: Shall be of steel/polyurethane/steel sandwich type construction with thermal break.
a. Panel Thickness: 2 inches (51 mm).

b. Exterior Surface: Flush non-repeating random stucco texture and 1/4 inch wide pinstriping.
c. Exterior Steel: .015 inch (0.38 mm), hot-dipped galvanized.
d. Sections roll formed with two 1-3/4 inch integral struts sealed with polypropylene rib caps per section.
e. Thermal Values: R-value of 17.50; U-value of 0.057.
f. Air Infiltration: 0.07 cfm at 15 mph.
g. Sound transmission class 22 when tested in accordance with ASTM E 413.
h. Outdoor-indoor transmission class 19 when tested in accordance with ASTM E 1332.
i. Insulation: CFC-free and HCFC-free polyurethane, fully encapsulated.
    1) Insulated sections tested in accordance with ASTM E 84 and achieve a Flame spread Index of 10 or less, and a Smoke Developed Index of 210 or less.
    2) Insulation material tested in accordance with ASTM D 1929 and achieve a minimum Flash Ignition temperature of 734 degrees F, and a minimum Self Ignition temperature of 950 degrees F.
    3) Insulated sections shall meet all requirements of the UBC 17-5 corner burn.
j. Ends: Hot-dipped galvanized steel, full height with end caps.
    1) 18 gauge.
k. Spring Counterbalance: Sized to weight of the door, with a helically wound, oil tempered torsion spring mounted on a steel shaft; cable drum of die cast aluminum with high strength galvanized aircraft cable. Sized with a minimum 5 to 1 safety factor.
    1) High cycle spring: 100,000 cycles.
l. Pass-Door:
    1) Provide with optional pass door.
m. Full View Aluminum Glazing Sections:
    1) 1/2 inch (12.5 mm) Tempered Double Insulating glass.
n. Partial Glazing of Steel Panels set in 2-piece high-impact black polymer frame:
    1) 1/2 inch (12.5 mm) Thermolite Insulated Tempered Glass
    2) .

2. Finish and Color:
    a. Two coat baked-on polyester:
        1) Interior color, white.
        1) Exterior color, white.
3. Windload Design: Provide to meet the Design/Performance requirements specified.
4. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.
5. Lock:
    a. Interior mounted slide lock with interlock switch for automatic operator.
6. Weatherstripping:
    a. Flexible bulb-type strip at bottom section.
    b. Flexible Jamb seals.
    c. Flexible Header seal.
7. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
    a. Size:
        1) 2 inch (51 mm).
    b. Type: Refer to Garage Door Schedule
        1) Standard lift.

2) Vertical lift.
3) High lift.
4) Low headroom.
5) Follow roof slope.

c. Horizontal track shall be reinforced with continuous angle of adequate length and gauge to minimize deflection.

d. Vertical track shall be graduated to provide wedge type weathertight closing with continuous angle mounting for steel or wood jambs, and shall be fully adjustable to seal door at jambs.

8. Manual Operation: Push-up.

9. Manual Operation: Chain hoist.

10. Electric Motor Operation: Provide UL listed electric operator, equal to Genie Commercial Operators, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.

a. Heavy Duty
1) Model GH – hoist

b. Entrapment Protection: Required for momentary contact, includes radio control operation.
1) Pneumatic sensing edge up to 18 feet (5.5 m) wide. Constant contact only complying with UL 325/2010.
2) Electric sensing edge monitored to meet UL 325/2010 equal to Miller Edge.
3) Photoelectric sensors monitored to meet UL 325/2010.

c. Operator Controls:
1) Push-button operated control stations with open, close, and stop buttons.
2) Flush mounting.
3) Surface mounting.
4) Interior location.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until openings have been properly prepared.

B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

C. Verify electric power is available and of correct characteristics.

D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.

B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.

C. Anchor assembly to wall construction and building framing without distortion or stress.

D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

E. Fit and align door assembly including hardware.

F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

G. Instruct Owner’s personnel in proper operating procedures and maintenance schedule.

3.4 ADJUSTING

A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

A. Clean doors, frames and glass using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

B. Protect installed products until completion of project.

END OF SECTION

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Glazed Aluminum Sectional Overhead Doors

B. Electric Operators and Controls.

C. Operating Hardware, tracks, and support.

1.2 RELATED SECTIONS

A. Section 03300 - Cast-In-Place Concrete: Prepared opening in concrete. Execution requirements for placement of anchors in concrete wall construction.

B. Section 04810 - Unit Masonry Assemblies: Prepared opening in masonry. Execution requirements for placement of anchors in masonry wall construction.

C. Section 05500 - Metal Fabrications: Steel frame and supports.

D. Section 06114 - Wood Blocking and Curbing: Rough wood framing and blocking for door opening.

E. Section 07900 - Joint Sealers: Perimeter sealant and backup materials.

F. Section 08710 - Door Hardware: Cylinder locks.

G. Section 09900 - Paints and Coatings: Field painting.

H. Section 16150 - Wiring Connections: Electrical service to door operator.

1.3 REFERENCES

A. ANSI/DASMA 102 - American National Standard Specifications for Sectional Overhead Type Doors.

B. ASTM A 123 – Zinc hot-dipped galvanized coatings on iron and steel products.

C. ASTM A 216 - Specifications for sectional overhead type doors.

D. ASTM A 229 - Steel wire, oil-tempered for mechanical springs.

E. ASTM A 653 - Steel sheet, zinc-coated galvanized by the hot-dipped process, commercial quality.

F. ASTM D 1929 - Ignition temperature test to determine flash and ignition temperature of foamed plastics.

G. ASTM E 84 - Tunnel test for flame spread and smoke developed index.

H. ASTM E 330 - Structural performance of exterior windows, curtain walls, and doors by uniform static air pressure difference.

I. ASTM E 413 - Classification for Rating Sound Insulation

J. ASTM E 1332 - Standard Classification for Rating Outdoor-Indoor Sound Attenuation.

K. ASTM E 283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

1.4 DESIGN / PERFORMANCE REQUIREMENTS

A. Wind Loads: Design and size components to withstand loads caused by pressure and suction of wind acting normal to plane of wall as calculated in accordance with applicable code.
1. Design pressure of _____ lb/sq ft (_____kPa).

B. Wiring Connections: Requirements for electrical characteristics.
1. 115 volts, single phase, 60 Hz.
2. 230 volts, single phase, 60 Hz.
3. 230 volts, three phase, 60 Hz.
4. 460 volts, three phase, 60 Hz.

C. Single-Source Responsibility: Provide doors, tracks, motors, and accessories from one manufacturer for each type of door. Provide secondary components from source acceptable to manufacturer of primary components.

1.5 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

C. Shop Drawings: Indicate plans and elevations including opening dimensions and required tolerances, connection details, anchorage spacing, hardware locations, and installation details.

D. Manufacturer's Certificates: Certify products meet or exceed specified requirements.

E. Operation and Maintenance Data.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum five years documented experience.

B. Installer Qualifications: Authorized representative of the manufacturer with minimum five years documented experience.

C. Products Requiring Electrical Connection: Listed and classified by Underwriters Laboratories, Inc. acceptable to authority having jurisdiction as suitable for purpose specified.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store products in manufacturer's unopened labeled packaging until ready for installation.

B. Protect materials from exposure to moisture until ready for installation.

C. Store materials in a dry, ventilated weathertight location.

1.8 PROJECT CONDITIONS

A. Pre-Installation Conference: Convene a pre-installation conference just prior to commencement of field operations, to establish procedures to maintain optimum working conditions and to coordinate this work with related and adjacent work.

1.9 WARRANTY

A. Warranty: Manufacturer’s limited door and operators System warranty for 10 years against cracking, splitting or deterioration of steel skin due to rust.

B. Warranty: Manufacturer’s limited door and operators System warranty for 8 years against cracking, splitting or deterioration due to rust-through.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Wayne Dalton; 2501 S. State Highway 121 Business, Suite 200, Lewisville, TX 75067. ASD. Phone: (800) 827-3667; Web Site: www.wayne-dalton.com. Email: info@wayne-dalton.com.

B. Substitutions: Equivalent to be approved by Architect and Owner.

C. Requests for substitutions will be considered in accordance with provisions of Section 01600.

2.2 GLAZED ALUMINUM SECTIONAL OVERHEAD DOORS

A. Glazed Sectional Overhead Doors: Wayne Dalton 452 Series Aluminum Doors. Units shall have the following characteristics:
1. Door Assembly: Stile and rail assembly of aluminum alloy 6063-T6, 1-3/8 inch thick stiles and rails, joined with self tapping screws.
a. Rails: Top and bottom rails with 3-1/2 inches wide, lower intermediate rail 1-3/8 inches, upper rail 1-5/8 inches, minimum wall thickness 0.062 inch.

1) Provide with polyurethane filled rails and stiles with R-values up to 3.91.

b. Stiles: Top, bottom, and end stiles are 3-1/2 inches wide, center stile 3 inches wide, minimum wall thickness 0.062 inch.

c. Springs:
1) High cycle spring: 100,000 cycles.

d. Glazing:
1) 1/8 inch (3 mm) Clear Tempered glass.
2) .

2. Finish and Color:
a. Powder Coating Finish: Color as selected by Architect from manufacturer's standard colors.

3. Windload Design: Provide to meet the Design/Performance requirements specified.

4. Hardware: Galvanized steel hinges and fixtures. Ball bearing rollers with hardened steel races.

5. Lock:
a. .
b. Interior mounted slide lock with interlock switch for automatic operator.

6. Weatherstripping:
a. Flexible bulb-type strip at bottom section.
b. Flexible Jamb seals.
c. Flexible Header seal.

7. Track: Provide track as recommended by manufacturer to suit loading required and clearances available.
a. Size:
1) 2 inch (51 mm).

b. Type:
1) Vertical lift.
2) High lift.
3) Low headroom.
4) Follow roof slope.

a. Horizontal track shall be reinforced with continuous angle of adequate length and gauge to minimize deflection.

b. Vertical track shall be graduated to provide wedge type weathertight closing with continuous angle mounting for steel or wood jambs, and shall be fully adjustable to seal door at jambs.

8. Electric Motor Operation: Provide UL listed electric operator, equal to Genie Commercial Operators, size and type as recommended by manufacturer to move door in either direction at not less than 2/3 foot nor more than 1 foot per second.
a. Heavy Duty
1) Model GH – hoist

b. Entrapment Protection: Required for momentary contact, includes radio control operation.
1) Pneumatic sensing edge up to 18 feet (5.5 m) wide. Constant contact only complying with UL 325/2010.
2) Electric sensing edge monitored to meet UL 325/2010 equal to Miller Edge.
3) Photoelectric sensors monitored to meet UL 325/2010.

c. Operator Controls:
1) Push-button operated control stations with open, close, and stop buttons.
2) Flush mounting.
3) Surface mounting.

4) Interior location.

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until openings have been properly prepared.

B. Verify wall openings are ready to receive work and opening dimensions and tolerances are within specified limits.

C. Verify electric power is available and of correct characteristics.

D. If preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

3.3 INSTALLATION

A. Install overhead doors and track in accordance with approved shop drawings and the manufacturer's printed instructions.

B. Coordinate installation with adjacent work to ensure proper clearances and allow for maintenance.

C. Anchor assembly to wall construction and building framing without distortion or stress.

D. Securely brace door tracks suspended from structure. Secure tracks to structural members only.

E. Fit and align door assembly including hardware.

F. Coordinate installation of electrical service. Complete power and control wiring from disconnect to unit components.

G. Instruct Owner’s personnel in proper operating procedures and maintenance schedule.

3.4 ADJUSTING

A. Test for proper operation and adjust as necessary to provide proper operation without binding or distortion

B. Adjust hardware and operating assemblies for smooth and noiseless operation.

3.5 CLEANING

A. Clean doors, frames and glass using non-abrasive materials and methods recommended by manufacturer.

B. Remove labels and visible markings.

C. Touch-up, repair or replace damaged products before Substantial Completion.

3.6 PROTECTION

A. Do not permit construction traffic through overhead door openings after adjustment and cleaning.

B. Protect installed products until completion of project.

END OF SECTION

SECTION 084113 - ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Exterior and interior storefront framing.
2. Exterior and interior manual-swing entrance doors and door-frame units.

1.3 SUSTAINABLE DESIGN SUBMITTALS

A. Refer to Section 01 8113 for sustainable design submittal requirements.

1.4 PERFORMANCE REQUIREMENTS

A. General Performance: Aluminum-framed systems shall withstand the effects of the following performance requirements without exceeding performance criteria or failure due to defective manufacture, fabrication, installation, or other defects in construction:
   1. Movements of supporting structure indicated on Drawings including, but not limited to, story drift and deflection from uniformly distributed and concentrated live loads.
      a. Dimensional tolerances of building frame and other adjacent construction.
   2. Failure includes the following:
      a. Deflection exceeding specified limits.
      b. Thermal stresses transferring to building structure.
      c. Framing members transferring stresses, including those caused by thermal and structural movements to glazing.
      d. Glazing-to-glazing contact.
      e. Noise or vibration created by wind and by thermal and structural movements.
      f. Loosening or weakening of fasteners, attachments, and other components.
      g. Sealant failure.
      h. Failure of operating units.

B. Delegated Design: Design aluminum-framed systems, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.

C. Structural Loads:
   1. Wind Loads:.
      a. Basic Wind Speed: 90 mph (40 m/s).
      b. Importance Factor: 1.
      c. Exposure Category: B.

D. Deflection of Framing Members:
   1. Deflection Normal to Wall Plane: Limited to [edge of glass in a direction perpendicular to glass plane shall not exceed L/175 of the glass edge length for each individual glazing lite.
   2. Deflection Parallel to Glazing Plane: Limited to L/360 of clear span or 1/8 inch (3.2 mm), whichever is smaller.

E. Structural-Test Performance: Provide aluminum-framed systems tested according to ASTM E 330 as follows:
   1. When tested at positive and negative wind-load design pressures, systems do not evidence deflection exceeding specified limits.
   2. When tested at 150 percent of positive and negative wind-load design pressures, systems, including anchorage, do not evidence material failures, structural distress, and permanent deformation of main framing members exceeding 0.2 percent of span.
   3. Test Durations: As required by design wind velocity, but not fewer than 10 seconds.

F. Windborne-Debris-Impact-Resistance Performance: Provide aluminum-framed systems that pass missile-impact and cyclic-pressure tests when tested according to [ASTM E 1886 and testing information in ASTM E 1996.
   1. Large-Missile Impact: For aluminum-framed systems located within 30 feet (9.1 m) of grade.
   2. Small-Missile Impact: For aluminum-framed systems located more than 30 feet (9.1 m) above grade.

G. Story Drift: Provide aluminum-framed systems that accommodate design displacement of adjacent stories indicated.
   1. Design Displacement: As indicated on Drawings.
   2. Test Performance: Meet criteria for passing, based on building occupancy type, when tested according to AAMA 501.4 1.5 times design displacement.

H. Air Infiltration: Provide aluminum-framed systems with maximum air leakage through fixed glazing and framing areas of 0.06 cfm/sq. ft. (0.03 L/s per sq. m) of fixed wall area when tested according to ASTM E 283 at a minimum static-air-pressure difference of 1.57 lbf/sq. ft. (75 Pa).

I. Water Penetration under Dynamic Pressure: Provide aluminum-framed systems that do not evidence water leakage through fixed glazing and framing areas when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of positive wind-load design pressure, but not less than 6.24 lbf/sq. ft. (300 Pa).
   1. Maximum Water Leakage: According to AAMA 501.1 No uncontrolled water penetrating aluminum-framed systems or water appearing on systems' normally exposed interior surfaces from sources other than condensation. Water leakage

does not include water controlled by flashing and gutters that is drained to exterior and water that cannot damage adjacent materials or finishes.

J. Thermal Movements: Provide aluminum-framed systems that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
   1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
   2. Test Performance: No buckling; stress on glass; sealant failure; excess stress on framing, anchors, and fasteners; or reduction of performance when tested according to AAMA 501.5.
      a. High Exterior Ambient-Air Temperature: That which produces an exterior metal-surface temperature of 180 deg F (82 deg C).
      b. Low Exterior Ambient-Air Temperature: 0 deg F (minus 18 deg C).
   3. Interior Ambient-Air Temperature: 75 deg F (24 deg C).

K. Condensation Resistance: Provide aluminum-framed systems with fixed glazing and framing areas having condensation-resistance factor (CRF) of not less than 45 when tested according to AAMA 1503.

L. Thermal Conductance: Provide aluminum-framed systems with fixed glazing and framing areas having an average U-factor of not more than 0.45 Btu/sq. ft. x h x deg F when tested according to AAMA 1503.

M. Sound Transmission: Provide aluminum-framed systems with fixed glazing and framing areas having the following sound-transmission characteristics:
   1. Sound Transmission Class (STC): Minimum 26 STC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 413.
   2. Outdoor-Indoor Transmission Class (OITC): Minimum 26 OITC when tested for laboratory sound transmission loss according to ASTM E 90 and determined by ASTM E 1332.

1.5 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1.6 ACTION SUBMITTALS

A. Product Data: For each type of product.

   1. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes.

B. Sustainable Design Submittals:

   1. Refer to Section 01 8113 for sustainable design submittal requirements.

C. Shop Drawings: For aluminum-framed entrances and storefronts. Include plans, elevations, sections, full-size details, and attachments to other work.

1. Include details of provisions for assembly expansion and contraction and for draining moisture occurring within the assembly to the exterior.
2. Include full-size isometric details of each vertical-to-horizontal intersection of aluminum-framed entrances and storefronts, showing the following:

a. Joinery, including concealed welds.
b. Anchorage.
c. Expansion provisions.
d. Glazing.
e. Flashing and drainage.

3. Show connection to and continuity with adjacent thermal, weather, air, and vapor barriers.

D. Samples for Initial Selection: For units with factory-applied color finishes.

E. Samples for Verification: For each type of exposed finish required, in manufacturer's standard sizes.

F. Fabrication Sample: Of each vertical-to-horizontal intersection of assemblies, made from 12-inch (300-mm) lengths of full-size components and showing details of the following:

1. Joinery, including concealed welds.
2. Anchorage.
3. Expansion provisions.
4. Glazing.
5. Flashing and drainage.

G. Entrance Door Hardware Schedule: Prepared by or under supervision of supplier, detailing fabrication and assembly of entrance door hardware, as well as procedures and diagrams. Coordinate final entrance door hardware schedule with doors, frames, and related work to ensure proper size, thickness, hand, function, and finish of entrance door hardware.

H. Delegated-Design Submittal: For aluminum-framed entrances and storefronts indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

1.7 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Energy Performance Certificates: For aluminum-framed entrances and storefronts, accessories, and components, from manufacturer.

1. Basis for Certification: NFRC-certified energy performance values for each aluminum-framed entrance and storefront.

C. Product Test Reports: For aluminum-framed entrances and storefronts, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Quality-Control Program: Developed specifically for Project, including fabrication and installation, according to recommendations in ASTM C 1401. Include periodic quality-control reports.

E. Source quality-control reports.

F. Field quality-control reports.

G. Sample Warranties: For special warranties.

1.8 CLOSEOUT SUBMITTALS

A. Maintenance Data: For aluminum-framed entrances and storefronts to include in maintenance manuals.

B. Maintenance Data for Structural Sealant: For structural-sealant-glazed storefront to include in maintenance manuals. Include ASTM C 1401 recommendations for post-installation-phase quality-control program.

1.9 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.

1.10 WARRANTY

A. Special Warranty: Manufacturer, 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. Failures include, but are not limited to, the following:

a. Structural failures including, but not limited to, excessive deflection.

b. Noise or vibration created by wind and thermal and structural movements.
c. Deterioration of metals, metal finishes, and other materials beyond normal weathering.
d. Water penetration through fixed glazing and framing areas.
e. Failure of operating components.

2. Warranty Period: 10 Insert number 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. Deterioration includes, but is not limited to, the following:

a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.

2. Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Delegated Design: Engage a qualified professional engineer, as defined in Section Part 1.4 Performance Requirements.to design aluminum-framed entrances and storefronts.

B. 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.

2.2 MANUFACTURERS

A. Thermally Improved System: Basis of Design; Subject to the requirements specified, the basis of design product is Trifab 451UT thermally broken framing system and Insulclad 360 Thermally Broken Swing Medium Stile doors manufactured by The Kawneer Company. Other acceptable manufacturers, subject to compliance with the requirements specified, include:
1. EFCO Corporation
2. Tubelite Inc.
3. Wausau Window and Wall Systems

B. Interior System: Basis of Design; Subject to the requirements specified, the basis of design product is Trifab 450 framing system and 350 Swing Medium Stile doors

manufactured by The Kawneer Company. Other acceptable manufacturers, subject to compliance with the requirements specified, include:

1. EFCO Corporation
2. Tubelite Inc.
3. Wausau Window and Wall Systems

C. Source Limitations: Obtain all components of aluminum-framed entrance and storefront system, including framing and accessories, from single manufacturer.

2.3 FRAMING

A. Framing Members: Manufacturer's extruded- or formed-aluminum framing members of thickness required and reinforced as required to support imposed loads.

1. Construction: Thermally broken.
2. Glazing System: Retained mechanically with gaskets on four sides.
3. Glazing Plane: Front.
4. Finish: High-performance organic finish.
5. Fabrication Method: Field-fabricated stick system.

B. Backer Plates: Manufacturer's standard, continuous backer plates for framing members, if not integral, where framing abuts adjacent construction.

C. Brackets and Reinforcements: Manufacturer's standard high-strength aluminum with nonstaining, nonferrous shims for aligning system components.

D. Materials:

1. Aluminum: Alloy and temper recommended by manufacturer for type of use and finish indicated.

   a. Sheet and Plate: ASTM B 209 (ASTM B 209M).
   b. Extruded Bars, Rods, Profiles, and Tubes: ASTM B 221 (ASTM B 221M).
   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.
3. Glazing Stops and Gaskets: Beveled or Square, snap-on, extruded-aluminum stops and preformed gaskets.

    a. Provide nonremovable glazing stops on outside of door.

2.5 ENTRANCE DOOR HARDWARE

A. Entrance Door Hardware: Hardware not specified in this Section is specified in Section 087100 "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, and products complying with BHMA standard referenced.
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.
    b. Accessible Interior Doors: Not more than 5 lbf (22.2 N) to fully open door.

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. 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.

E. Manual Flush Bolts: BHMA A156.16, Grade 1.

F. Automatic and Self-Latching Flush Bolts: BHMA A156.3, 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 087100 "Door Hardware."

1. Keying: Masterkey system. Permanently inscribe each key with a visual key control number and include notation "DO NOT DUPLICATE".

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.

1. Compression Type: Made of ASTM D 2000, molded neoprene, or ASTM D 2287, molded PVC.
2. Sliding Type: AAMA 701/702, made of wool, polypropylene, or nylon woven pile with nylon-fabric or aluminum-strip backing.

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).

R. Finger Guards: Manufacturer's standard collapsible neoprene or PVC gasket anchored to frame hinge-jamb at center-pivoted doors.

2.6 GLAZING

A. Glazing: Comply with Section 088000 "Glazing."

B. Glazing Gaskets: Manufacturer's standard sealed-corner pressure-glazing system of black, resilient elastomeric glazing gaskets, setting blocks, and shims or spacers.

C. Glazing Sealants: As recommended by manufacturer.

D. Structural Glazing Sealants: ASTM C 1184, chemically curing silicone formulation that is compatible with system components with which it comes in contact, specifically formulated and tested for use as structural sealant and approved by structural-sealant manufacturer for use in storefront system indicated.

1. Color: Black.

2.7 ACCESSORIES

A. Fasteners and Accessories: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding fasteners and accessories compatible with adjacent materials.

1. Use self-locking devices where fasteners are subject to loosening or turning out from thermal and structural movements, wind loads, or vibration.
2. Reinforce members as required to receive fastener threads.
3. Use exposed fasteners with countersunk Phillips screw heads, finished to match framing system.

B. Anchors: Three-way adjustable anchors with minimum adjustment of 1 inch (25.4 mm) that accommodate fabrication and installation tolerances in material and finish compatible with adjoining materials and recommended by manufacturer.

1. Concrete and Masonry Inserts: Hot-dip galvanized cast-iron, malleable-iron, or steel inserts complying with ASTM A 123/A 123M or ASTM A 153/A 153M requirements.

C. Concealed Flashing: Manufacturer's standard corrosion-resistant, nonstaining, nonbleeding flashing compatible with adjacent materials.

D. Bituminous Paint: Cold-applied asphalt-mastic paint complying with SSPC-Paint 12 requirements except containing no asbestos, formulated for 30-mil (0.762-mm) thickness per coat.

2.8 FABRICATION

A. Form or extrude aluminum shapes before finishing.

B. Weld in concealed locations to greatest extent possible to minimize distortion or discoloration of finish. Remove weld spatter and welding oxides from exposed surfaces by descaling or grinding.

C. Fabricate components that, when assembled, have the following characteristics:

1. Profiles that are sharp, straight, and free of defects or deformations.
2. Accurately fitted joints with ends coped or mitered.
3. Physical and thermal isolation of glazing from framing members.
4. Accommodations for thermal and mechanical movements of glazing and framing to maintain required glazing edge clearances.
5. Provisions for field replacement of glazing from exterior.
6. Fasteners, anchors, and connection devices that are concealed from view to greatest extent possible.

D. Mechanically Glazed Framing Members: Fabricate for flush glazing without projecting stops.

E. Structural-Sealant-Glazed Framing Members: Include accommodations for using temporary support device to retain glazing in place while structural sealant cures.

F. Storefront Framing: Fabricate components for assembly using shear-block system.

G. Entrance Door Frames: Reinforce as required to support loads imposed by door operation and for installing entrance door hardware.

1. At exterior doors, provide compression weather stripping at fixed stops.
2. At interior doors, provide silencers at stops to prevent metal-to-metal contact. Install three silencers on strike jamb of single-door frames and two silencers on head of frames for pairs of doors.

H. Entrance Doors: Reinforce doors as required for installing entrance door hardware.

1. At pairs of exterior doors, provide sliding-type weather stripping retained in adjustable strip and mortised into door edge.
2. At exterior doors, provide weather sweeps applied to door bottoms.

I. 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.

J. After fabrication, clearly mark components to identify their locations in Project according to Shop Drawings.

2.9 ALUMINUM FINISHES

A. High-Performance Organic Finish: Two-coat fluoropolymer finish complying with AAMA 2604 and containing not less than 50 percent PVDF or FEVE resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.

1. Color and Gloss: As selected by Architect from manufacturer's full range.

2.10 SOURCE QUALITY CONTROL

A. Structural Sealant: Perform quality-control procedures complying with ASTM C 1401 recommendations including, but not limited to, assembly material qualification procedures, sealant testing, and assembly fabrication reviews and checks.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Prepare surfaces that are in contact with structural sealant according to sealant manufacturer's written instructions to ensure compatibility and adhesion. Preparation includes, but is not limited to, cleaning and priming surfaces.

3.3 INSTALLATION

A. General:

1. Comply with manufacturer's written instructions.
2. Do not install damaged components.
3. Fit joints to produce hairline joints free of burrs and distortion.
4. Rigidly secure nonmovement joints.
5. Install anchors with separators and isolators to prevent metal corrosion and electrolytic deterioration and to prevent impeding movement of moving joints.
6. Seal perimeter and other joints watertight unless otherwise indicated.

B. Metal Protection:

1. Where aluminum is in contact with dissimilar metals, protect against galvanic action by painting contact surfaces with materials recommended by manufacturer for this purpose or by installing nonconductive spacers.
2. Where aluminum is in contact with concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint.

C. Set continuous sill members and flashing in full sealant bed as specified in Section 079200 "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 088000 "Glazing."

G. Install weatherseal sealant according to Section 079200 "Joint Sealants" and according to sealant manufacturer's written instructions to produce weatherproof joints. Install joint filler behind sealant as recommended by sealant manufacturer.

H. Entrance Doors: Install doors to produce smooth operation and tight fit at contact points.

1. Exterior Doors: Install to produce weathertight enclosure and tight fit at weather stripping.
2. Field-Installed Entrance Door Hardware: Install surface-mounted entrance door hardware according to entrance door hardware manufacturers' written instructions using concealed fasteners to greatest extent possible.

3.4 ERECTION TOLERANCES

A. Erection Tolerances: Install aluminum-framed entrances and storefronts to comply with the following maximum tolerances:

1. Plumb: 1/8 inch in 10 feet (3.2 mm in 3 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
2. Level: 1/8 inch in 20 feet (3.2 mm in 6 m); 1/4 inch in 40 feet (6.35 mm in 12.2 m).
3. Alignment:

    a. Where surfaces abut in line or are separated by reveal or protruding element up to 1/2 inch (12.7 mm) wide, limit offset from true alignment to 1/16 inch (1.6 mm).
    b. Where surfaces are separated by reveal or protruding element from 1/2 to 1 inch (12.7 to 25.4 mm) wide, limit offset from true alignment to 1/8 inch (3.2 mm).
    c. Where surfaces are separated by reveal or protruding element of 1 inch (25.4 mm) wide or more, limit offset from true alignment to 1/4 inch (6 mm).

4. Location: Limit variation from plane to 1/8 inch in 12 feet (3.2 mm in 3.6 m); 1/2 inch (12.7 mm) over total length.

3.5 FIELD QUALITY CONTROL

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

B. Field Quality-Control Testing: Perform the following test on representative areas of aluminum-framed entrances and storefronts.

1. Water-Spray Test: Before installation of interior finishes has begun, areas designated by Architect shall be tested according to AAMA 501.2 and shall not evidence water penetration.

    a. Perform a minimum of two tests in areas as directed by Architect.
    b. Perform tests in each test area as directed by Architect. Perform at least three tests, prior to 35% completion..

C. Aluminum-framed entrances and storefronts will be considered defective if they do not pass tests and inspections.

D. Prepare test and inspection reports.

3.6 MAINTENANCE SERVICE

A. Entrance Door Hardware:

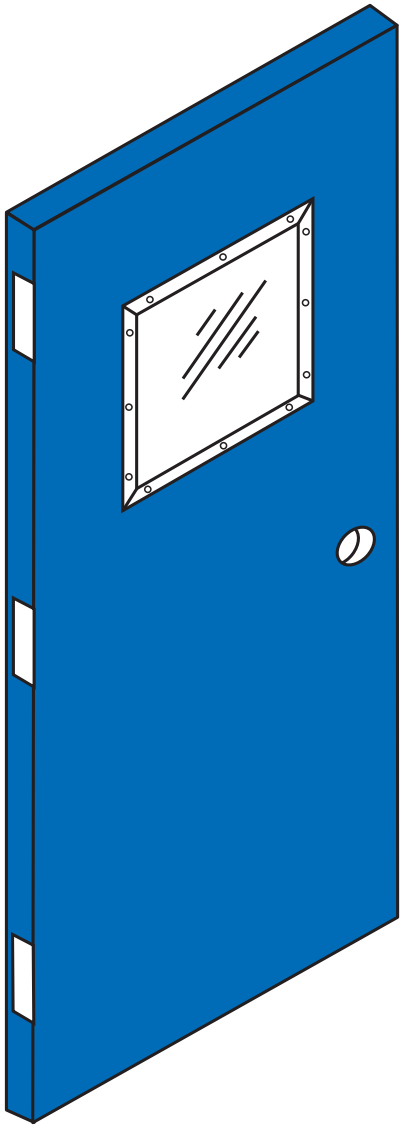
1. Maintenance Tools and Instructions: Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of entrance door hardware.
2. Initial Maintenance Service: Beginning at Substantial Completion, provide six months' full maintenance by skilled employees of entrance door hardware Installer. Include quarterly preventive maintenance, repair or replacement of worn or defective components, lubrication, cleaning, and adjusting as required for proper entrance door hardware operation at rated speed and capacity. Use parts and supplies that are the same as those used in the manufacture and installation of original equipment.

3.7 ENTRANCE DOOR HARDWARE SETS

END OF SECTION 084113

CORRIM Company

FRP DOORS



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1870 Stillman Drive • Oshkosh, WI 54901-1010
(920) 231-2000 FAX (920) 231-2238
Internet Address: www.corrim.com
E-mail Address: info@corrim.com

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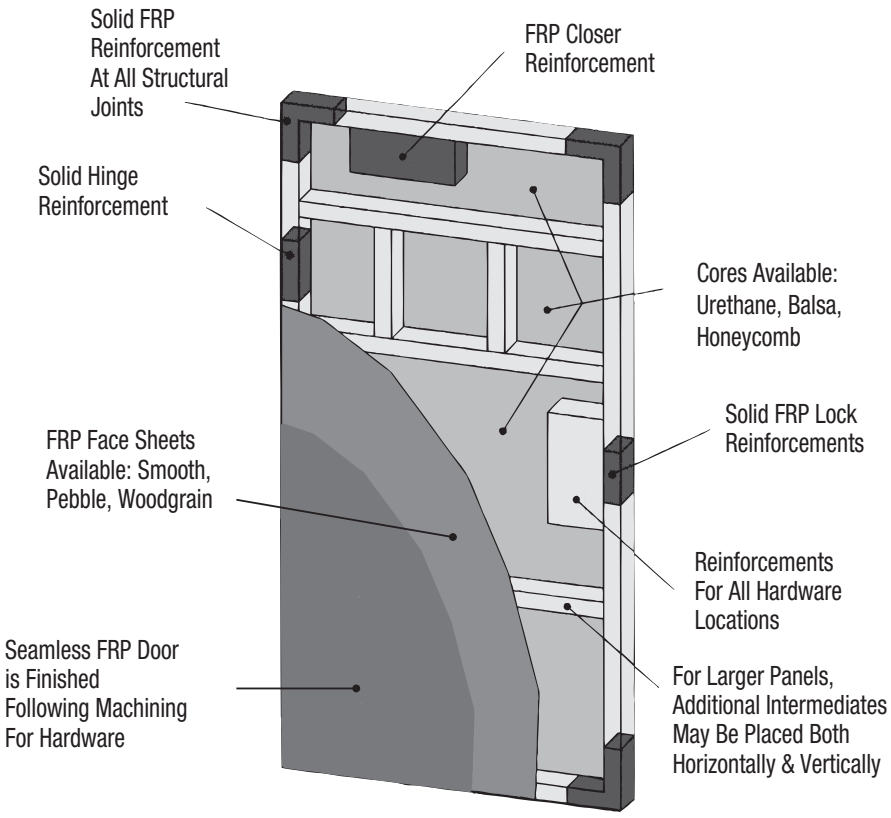
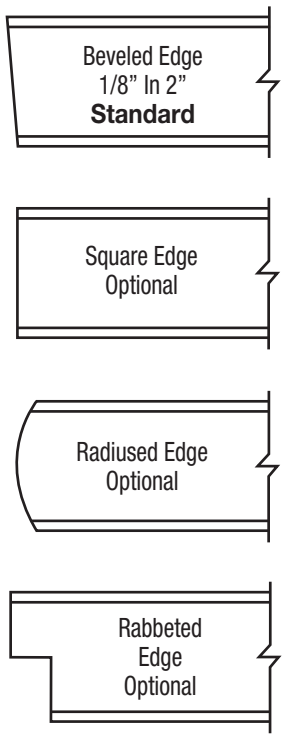
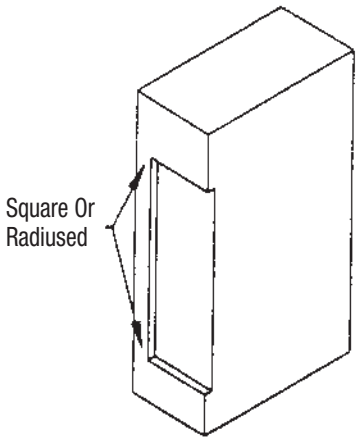
TYPICAL CONSTRUCTION DETAIL

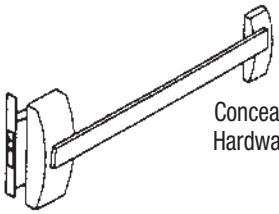


DOOR EDGE DETAILS

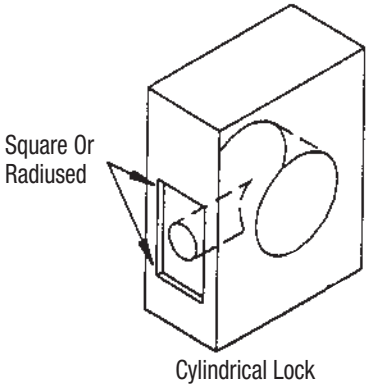




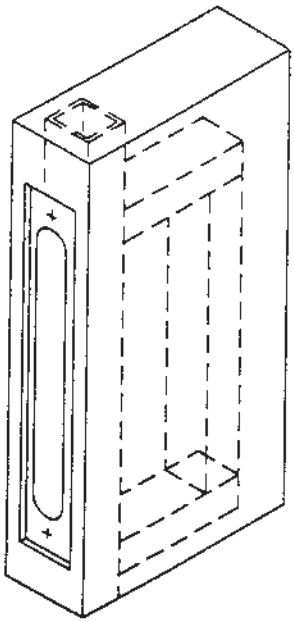
Hinge Preparation Per Template



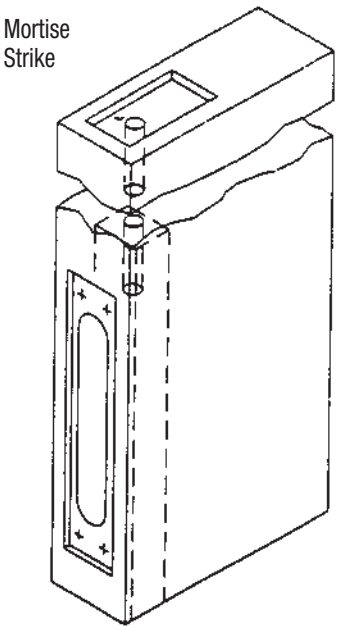
Concealed And Surface Panic Hardware Preps Are Available



Cylindrical Lock

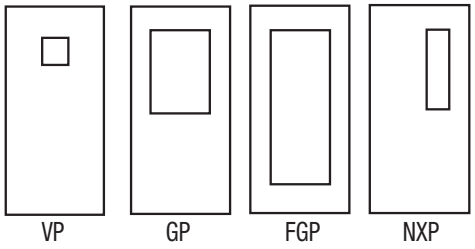


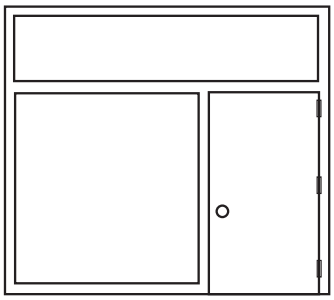
Mortise Lock Machined & Prepped Per Template Requirements



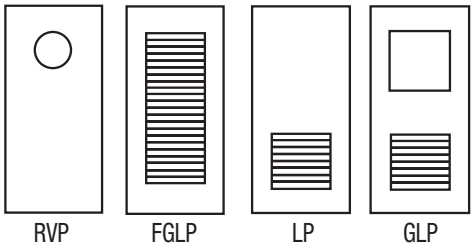
Lever Extension Flush Bolt Or Concealed Panic Rod Device

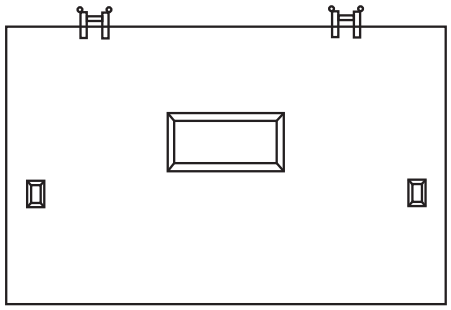
TYPICAL DOOR CONFIGURATIONS





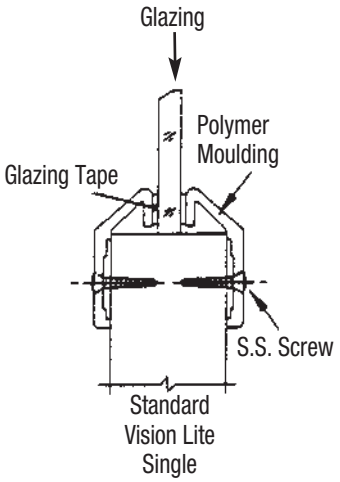
Transom and Sidelite
Door Systems

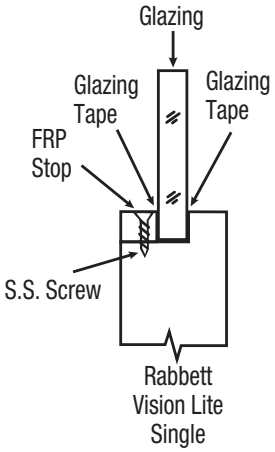


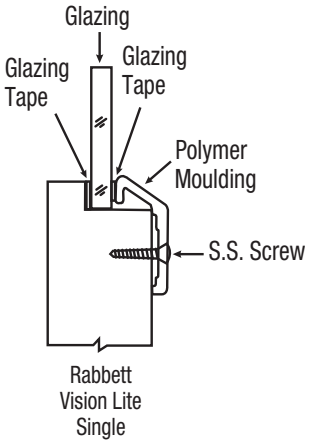


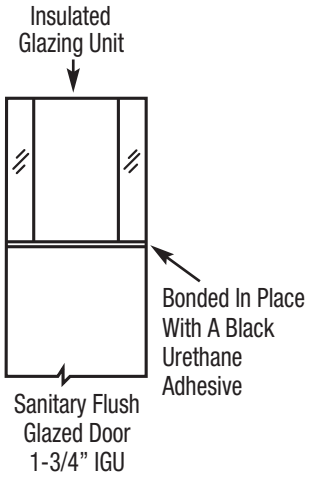
Sliding Panels
With Vision Area

OPTIONAL GLAZING DETAILS

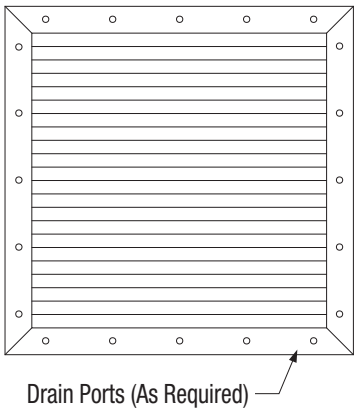


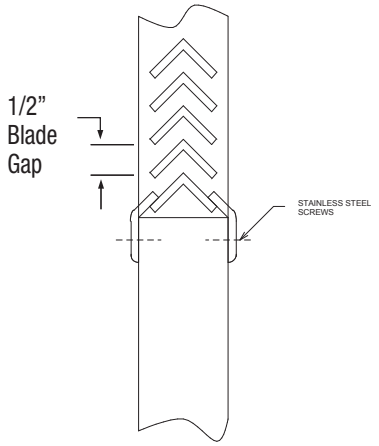






OPTIONAL LOUVER DETAILS





Typical
FRP Louver

HANDING DATA

How to Determine Hand and Swing

1. The hand of a door is determined from the outside.
2. The outside of an entrance door is the street side
3. The outside of a room door is the corridor side.
4. The outside of a communicating door is the side from which hinges are not visible with door closed.
5. The outside of a closet door is the room side.
6. The key side (x) will be outside, unless otherwise specified.

On Pairs of Doors Key Side

Right hand leaf is always active unless specified.

Outside

Left Hand Right Hand

Outside

Left Hand Reverse Right Hand Reverse

Outside

Double Swing In Double Swing Out

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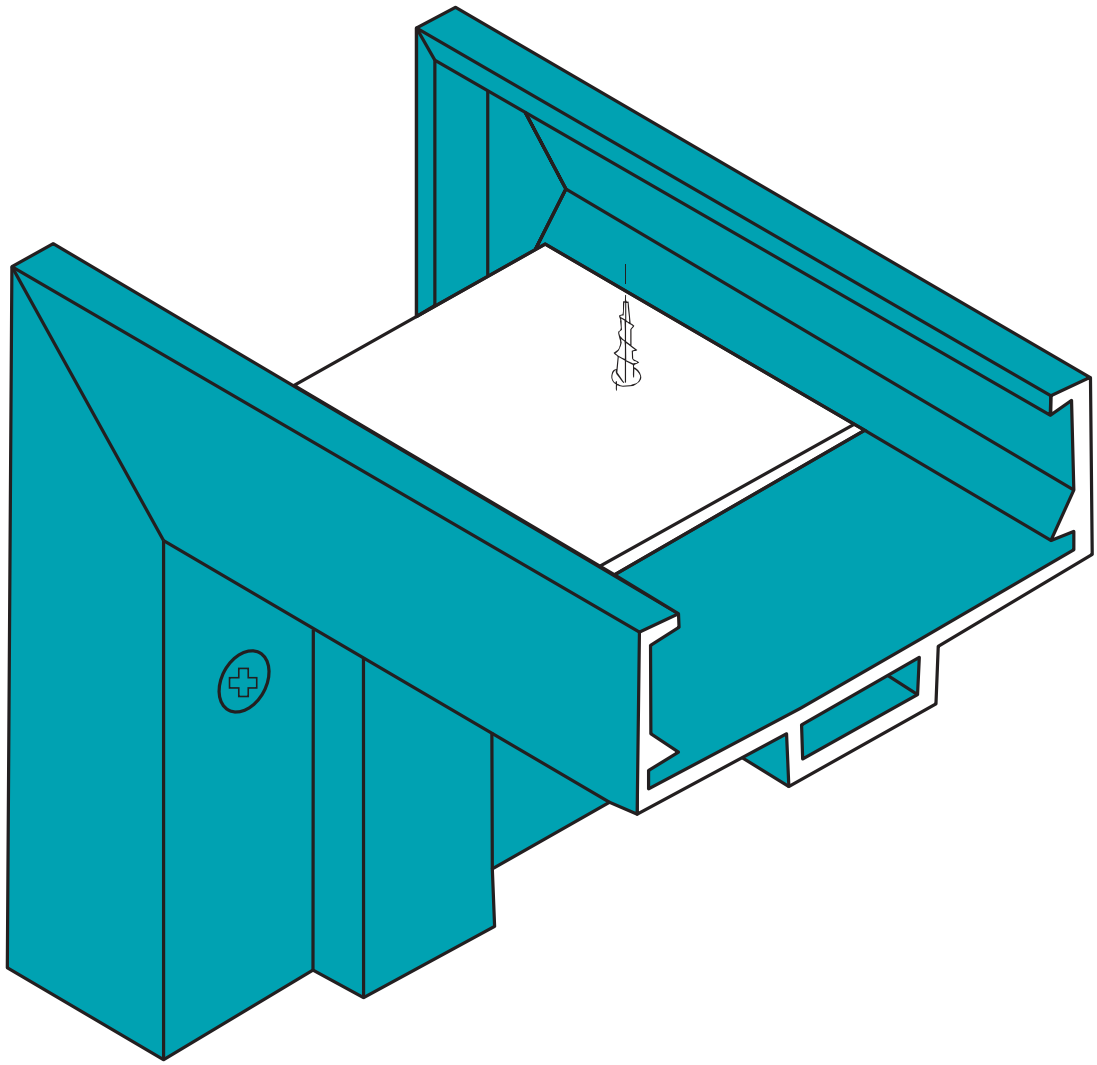
FRP FRAMES



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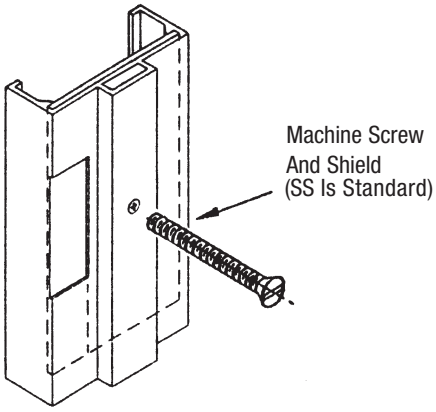
ANCHOR DETAILS

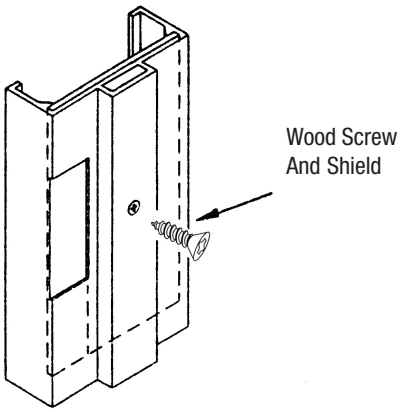
Corrim is not limited to standard anchors.
A partial selection of anchors is shown below and to the right.

EXISTING WALL

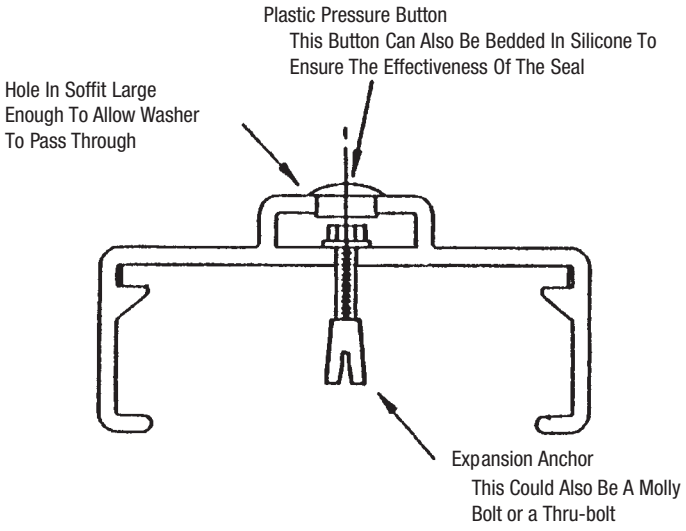
Existing Wall Anchor

Please Specify Wall Construction
(Masonry, Steel Stud, Wood Stud)





Concealed Anchor
Door Frame Anchoring System



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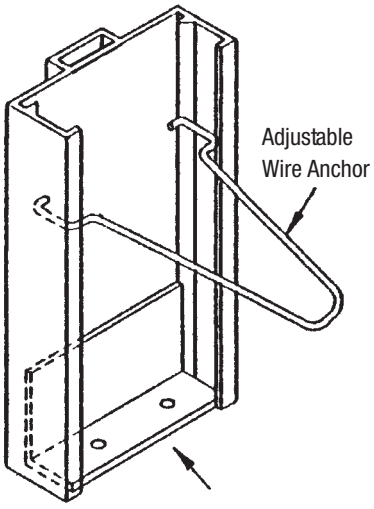
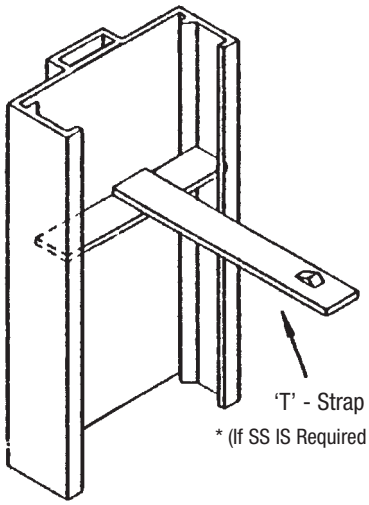
ANCHOR DETAILS

MASONRY

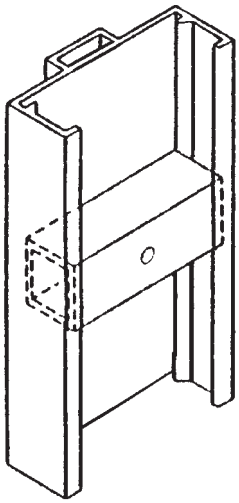


Universal Sill
Anchor
* (If SS IS Required Consult Factory)

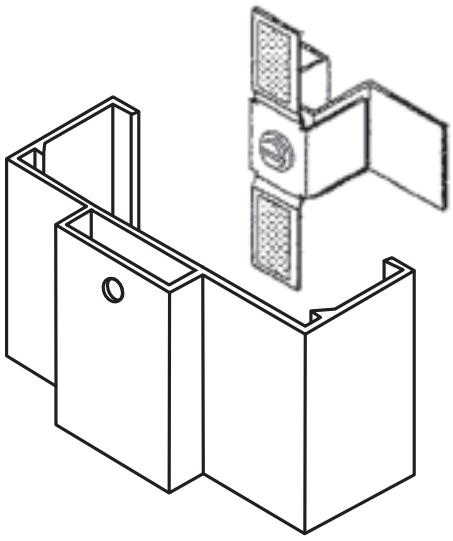


'T' - Strap Anchor
* (If SS IS Required Consult Factory)

NEW STUD



FRP Anchor Block



Drywall Compression Anchor

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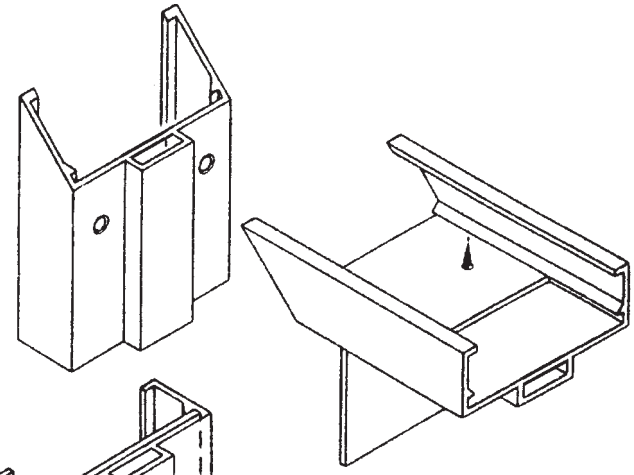
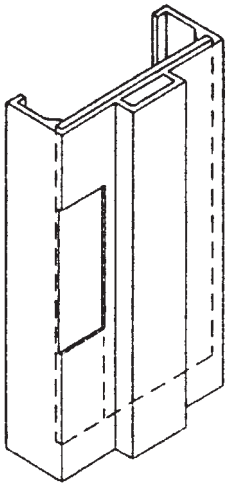
FRAME DETAILS



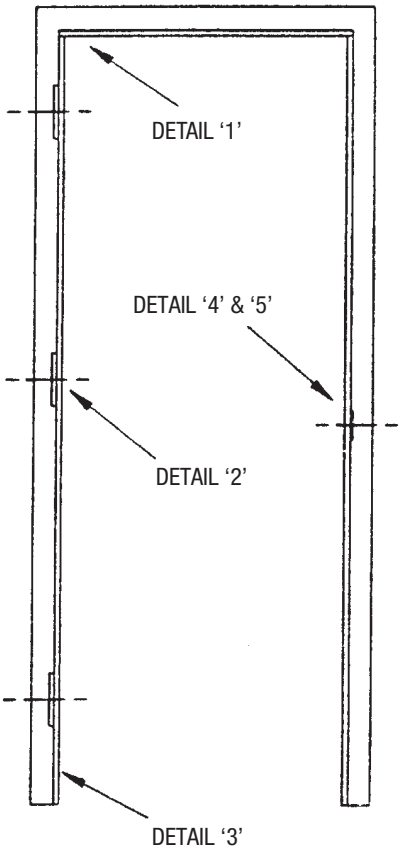
DETAIL ‘1’

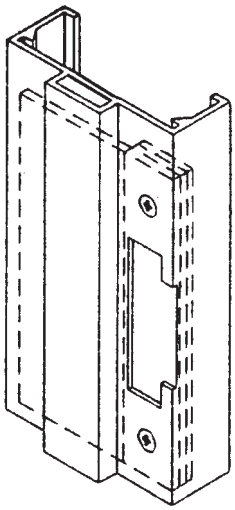
- A 2” Headbar For Single and Double Door Installations
- Corners Are Locked Together Utilizing FRP Reinforcement



DETAIL ‘2’

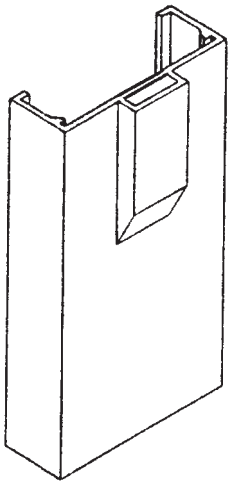
- Standard Hinge Machining For 4-1/2” x 4-1/2” x 4-1/2” x .180
- 5 x 4-1/2” x .190 and 4-1/2” x .180 Also Available





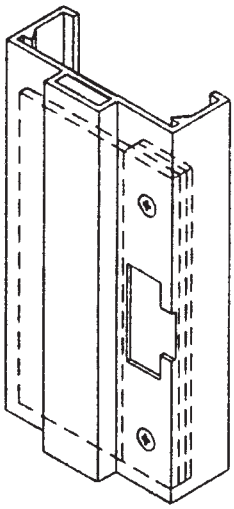
DETAIL ‘5’

- Standard 4-7/8” A.N.S.I. Strike Machining
- Accepts 1” Throw



DETAIL ‘3’

- Hospital Stop Frames Available For All Double Rabbeted Frames



DETAIL ‘4’

- Optional 2-3/4” A.N.S.I. Strike Machining
- Accepts 1” Throw

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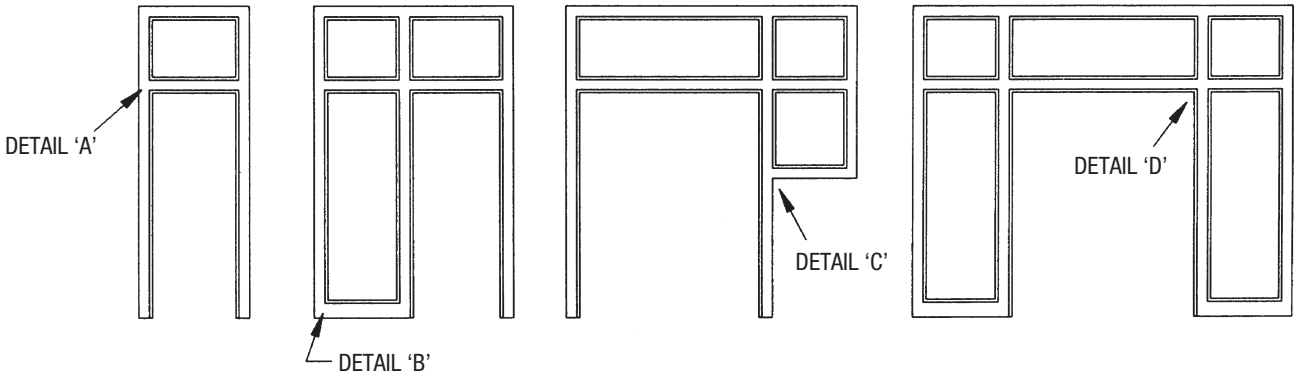
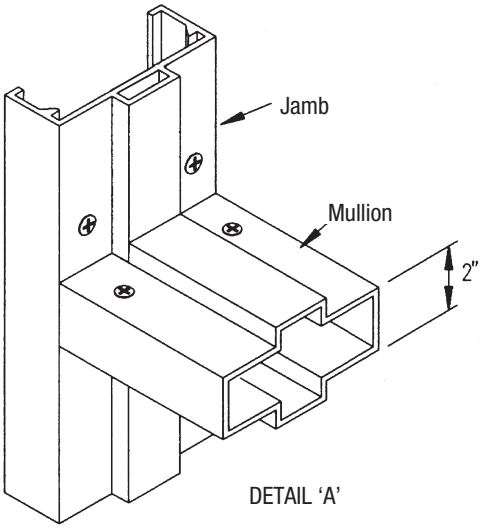
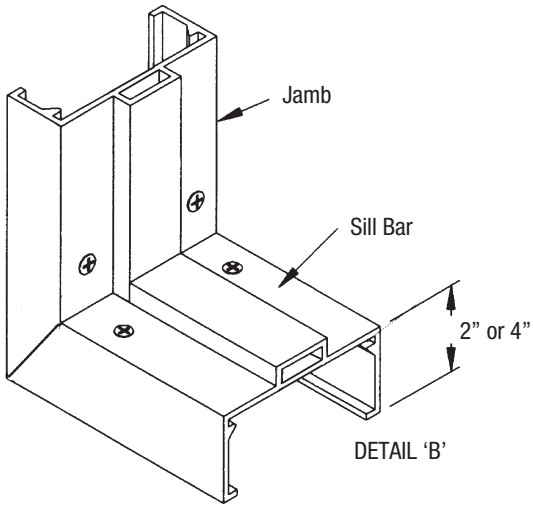
ARCHITECTURAL ENTRANCE SYSTEMS



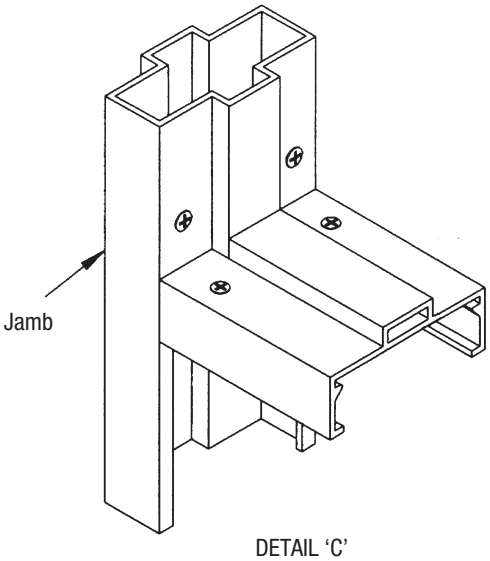
TYPICAL ELEVATIONS



DETAIL 'A'



DETAIL 'B'



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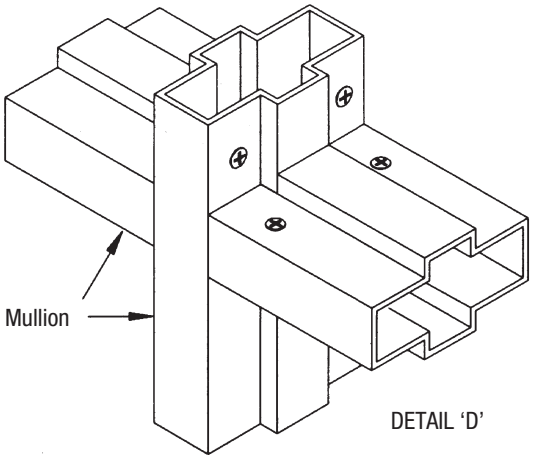
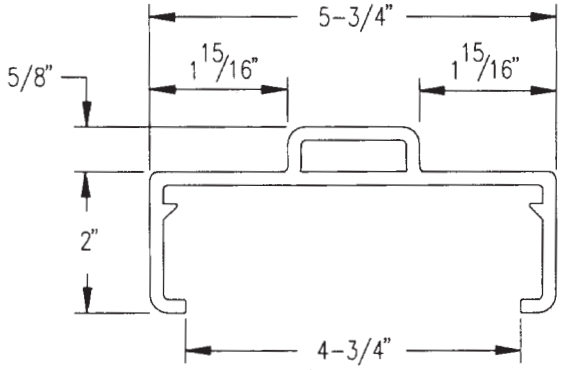
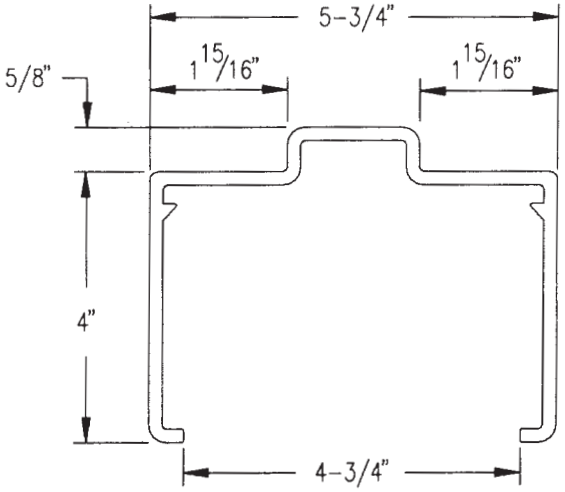


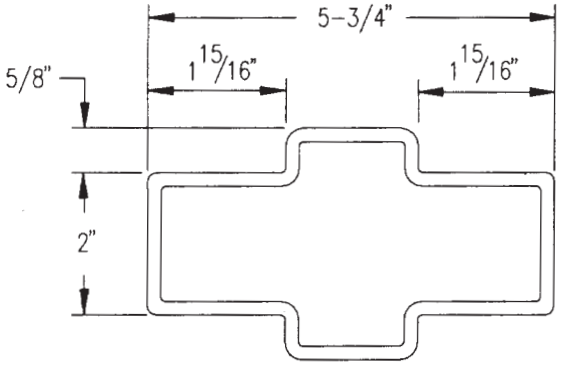
DETAIL 'D'

CORRIM STANDARD FRAME PROFILES

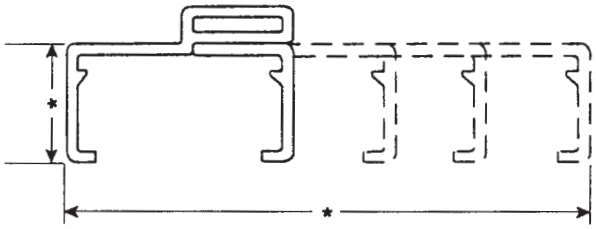
Note: All frames are built to fit a particular opening. Width, height, depth and wall material of each rough opening must be specified.







Modified Frames



***Note: Contact factory for special frame depth sizes.**

Handing Data

How To Determind Hand And Swing

1. The hand of a door is determined from the outside.
2. The outside of an entrance door is the street side.
3. The outside of a room door is the corridor side.
4. The outside of a communicating door is the side from which hinges are not visible with door closed.
5. The outside of a closet door is the room side.
6. The key side (x) will be outside, unless otherwise specified.

On Pairs Of Doors Key Side

Right hand leaf is always active unless specified.

Left Hand Right Hand

Left Hand Reverse Right Hand Reverse

Double Swing In Double Swing Out

SECTION 087100 - DOOR HARDWARE

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Mechanical and electrified door hardware
2. Electronic access control system components

B. Section excludes:

1. Windows
2. Cabinets (casework), including locks in cabinets
3. Signage
4. Toilet accessories
5. Overhead doors

C. Related Sections:

1. Division 01 "General Requirements" sections for Allowances, Alternates, Owner Furnished Contractor Installed, Project Management and Coordination.
2. Division 06 Section "Rough Carpentry"
3. Division 06 Section "Finish Carpentry"
4. Division 07 Section "Joint Sealants" for sealant requirements applicable to threshold installation specified in this section.
5. Division 08 Sections:
   a. "Metal Doors and Frames"
   b. "Flush Wood Doors"
   c. "Stile and Rail Wood Doors"
   d. "Interior Aluminum Doors and Frames"
   e. "Aluminum-Framed Entrances and Storefronts"
   f. "Stainless Steel Doors and Frames"
   g. "Special Function Doors"
   h. "Entrances"
6. Division 26 "Electrical" sections for connections to electrical power system and for low-voltage wiring.
7. Division 28 "Electronic Safety and Security" sections for coordination with other components of electronic access control system and fire alarm system.

1.02 REFERENCES

A. UL LLC

1. UL 10B - Fire Test of Door Assemblies
2. UL 10C - Positive Pressure Test of Fire Door Assemblies
3. UL 1784 - Air Leakage Tests of Door Assemblies
4. UL 305 - Panic Hardware

B. DHI - Door and Hardware Institute

1. Sequence and Format for the Hardware Schedule
2. Recommended Locations for Builders Hardware
3. Keying Systems and Nomenclature
4. Installation Guide for Doors and Hardware

C. NFPA – National Fire Protection Association

1. NFPA 70 – National Electric Code
2. NFPA 80 – Standard for Fire Doors and Other Opening Protectives
3. NFPA 101 – Life Safety Code
4. NFPA 105 – Smoke and Draft Control Door Assemblies
5. NFPA 252 – Fire Tests of Door Assemblies

D. ANSI - American National Standards Institute

1. ANSI A117.1 – 2017 Edition – Accessible and Usable Buildings and Facilities
2. ANSI/BHMA A156.1 - A156.29, and ANSI/BHMA A156.31 - Standards for Hardware and Specialties
3. ANSI/BHMA A156.28 - Recommended Practices for Keying Systems
4. ANSI/WDMA I.S. 1A - Interior Architectural Wood Flush Doors
5. ANSI/SDI A250.8 - Standard Steel Doors and Frames

1.03 SUBMITTALS

A. General:

1. Submit in accordance with Conditions of Contract and Division 01 Submittal Procedures.
2. Prior to forwarding submittal:
   a. Review drawings and Sections from related trades to verify compatibility with specified hardware.
   b. Highlight, encircle, or otherwise specifically identify on submittals: deviations from Contract Documents, issues of incompatibility or other issues which may detrimentally affect the Work.

B. Action Submittals:

1. Product Data: Submit technical product data for each item of door hardware, installation instructions, maintenance of operating parts and finish, and other information necessary to show compliance with requirements.
2. Riser and Wiring Diagrams: After final approval of hardware schedule, submit details of electrified door hardware, indicating:
   a. Wiring Diagrams: For power, signal, and control wiring and including:
      1) Details of interface of electrified door hardware and building safety and security systems.
      2) Schematic diagram of systems that interface with electrified door hardware.
      3) Point-to-point wiring.
      4) Risers.

3. Samples for Verification: If requested by Architect, submit production sample of requested door hardware unit in finish indicated and tagged with full description for coordination with schedule.
   a. Samples will be returned to supplier. Units that are acceptable to Architect may, after final check of operations, be incorporated into Work, within limitations of key coordination requirements.

4. Door Hardware Schedule:
   a. Submit concurrent with submissions of Product Data, Samples, and Shop Drawings. Coordinate submission of door hardware schedule with scheduling requirements of other work to facilitate fabrication of other work critical in Project construction schedule.
   b. Submit under direct supervision of a Door Hardware Institute (DHI) certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) with hardware sets in vertical format as illustrated by Sequence of Format for the Hardware Schedule published by DHI.
   c. Indicate complete designations of each item required for each opening, include:
      1) Door Index: door number, heading number, and Architect's hardware set number.
      2) Quantity, type, style, function, size, and finish of each hardware item.
      3) Name and manufacturer of each item.
      4) Fastenings and other pertinent information.
      5) Location of each hardware set cross-referenced to indications on Drawings.
      6) Explanation of all abbreviations, symbols, and codes contained in schedule.
      7) Mounting locations for hardware.
      8) Door and frame sizes and materials.
      9) Degree of door swing and handing.
      10) Operational Description of openings with electrified hardware covering egress, ingress (access), and fire/smoke alarm connections.

5. Key Schedule:
   a. After Keying Conference, provide keying schedule that includes levels of keying, explanations of key system's function, key symbols used, and door numbers controlled.
   b. Use ANSI/BHMA A156.28 "Recommended Practices for Keying Systems" as guideline for nomenclature, definitions, and approach for selecting optimal keying system.
   c. Provide 3 copies of keying schedule for review prepared and detailed in accordance with referenced DHI publication. Include schematic keying diagram and index each key to unique door designations.
   d. Index keying schedule by door number, keyset, hardware heading number, cross keying instructions, and special key stamping instructions.
   e. Provide one complete bitting list of key cuts and one key system schematic illustrating system usage and expansion. Forward bitting list, key cuts and key system schematic directly to Owner, by means as directed by Owner.
   f. Prepare key schedule by or under supervision of supplier, detailing Owner's final keying instructions for locks.

C. Informational Submittals:

1. Provide Qualification Data for Supplier, Installer and Architectural Hardware Consultant.
2. Provide Product Data:
   a. Certify that door hardware approved for use on types and sizes of labeled fire-rated doors complies with listed fire-rated door assemblies.
   b. Include warranties for specified door hardware.

D. Closeout Submittals:

1. Operations and Maintenance Data: Provide in accordance with Division 01 and include:
   a. Complete information on care, maintenance, and adjustment; data on repair and replacement parts, and information on preservation of finishes.
   b. Catalog pages for each product.
   c. Final approved hardware schedule edited to reflect conditions as installed.
   d. Final keying schedule

e. Copy of warranties including appropriate reference numbers for manufacturers to identify project.
f. As-installed wiring diagrams for each opening connected to power, both low voltage and 110 volts.

E. Inspection and Testing:

1. Submit written reports to the Owner and Authority Having Jurisdiction (AHJ) of the results of functional testing and inspection for:
   a. Fire door assemblies, in compliance with NFPA 80.
   b. Required egress door assemblies, in compliance with NFPA 101.

1.04 QUALITY ASSURANCE

A. Qualifications and Responsibilities:

1. Supplier: Recognized architectural hardware supplier with a minimum of 5 years documented experience supplying both mechanical and electromechanical door hardware similar in quantity, type, and quality to that indicated for this Project. Supplier to be recognized as a factory direct distributor by the manufacturer of the primary materials with a warehousing facility in the Project's vicinity. Supplier to have on staff, a certified Architectural Hardware Consultant (AHC) or Door Hardware Consultant (DHC) available to Owner, Architect, and Contractor, at reasonable times during the Work for consultation.
2. Installer: Qualified tradesperson skilled in the application of commercial grade hardware with experience installing door hardware similar in quantity, type, and quality as indicated for this Project.
3. Architectural Hardware Consultant: 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 meets these requirements:
   a. For door hardware: DHI certified AHC or DHC.
   b. Can provide installation and technical data to Architect and other related subcontractors.
   c. Can inspect and verify components are in working order upon completion of installation.
   d. Capable of producing wiring diagram and coordinating installation of electrified hardware with Architect and electrical engineers.

4. Single Source Responsibility: Obtain each type of door hardware from single manufacturer.

B. Certifications:

1. Fire-Rated Door Openings:
   a. Provide door hardware for fire-rated openings that complies with NFPA 80 and requirements of authorities having jurisdiction.
   b. Provide only items of door hardware that are listed products tested by UL LLC, Intertek Testing Services, or other testing and inspecting organizations acceptable to authorities having jurisdiction for use on types and sizes of doors indicated, based on testing at positive pressure and according to NFPA 252 or UL 10C and in compliance with requirements of fire-rated door and door frame labels.

2. Smoke and Draft Control Door Assemblies:
   a. Provide door hardware that meets requirements of assemblies tested according to UL 1784 and installed in compliance with NFPA 105

b. Comply with the maximum air leakage of 0.3 cfm/sq. ft. (3 cu. m per minute/sq. m) at tested pressure differential of 0.3-inch wg (75 Pa) of water.

3. Electrified Door Hardware
   a. Listed and labeled as defined in NFPA 70, Article 100, by testing agency acceptable to authorities having jurisdiction.

4. Accessibility Requirements:
   a. Comply with governing accessibility regulations cited in "REFERENCES" article 087100, 1.02.D3 herein for door hardware on doors in an accessible route. This project must comply with all Federal Americans with Disability Act regulations and all Local Accessibility Regulations.

C. Pre-Installation Meetings

1. Keying Conference
   a. Incorporate keying conference decisions into final keying schedule after reviewing door hardware keying system including:
      1) Function of building, flow of traffic, purpose of each area, degree of security required, and plans for future expansion.
      2) Preliminary key system schematic diagram.
      3) Requirements for key control system.
      4) Requirements for access control.
      5) Address for delivery of keys.

2. Pre-installation Conference
   a. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   b. Inspect and discuss preparatory work performed by other trades.
   c. Inspect and discuss electrical roughing-in for electrified door hardware.
   d. Review sequence of operation for each type of electrified door hardware.
   e. Review required testing, inspecting, and certifying procedures.
   f. Review questions or concerns related to proper installation and adjustment of door hardware.

3. Electrified Hardware Coordination Conference:
   a. Prior to ordering electrified hardware, schedule and hold meeting to coordinate door hardware with security, electrical, doors and frames, and other related suppliers.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Inventory door hardware on receipt and provide secure lock-up for hardware delivered to Project site. Promptly replace products damaged during shipping

B. Tag each item or package separately with identification coordinated with final door hardware schedule, and include installation instructions, templates, and necessary fasteners with each item or package. Deliver each article of hardware in manufacturer's original packaging.

C. Maintain manufacturer-recommended environmental conditions throughout storage and installation periods.

D. Provide secure lock-up for door hardware delivered to Project. Control handling and installation of hardware items so that completion of Work will not be delayed by hardware losses both before and after installation.

E. Handle hardware in manner to avoid damage, marring, or scratching. Correct, replace or repair products damaged during Work. Protect products against malfunction due to paint, solvent, cleanser, or any chemical agent.

F. Deliver keys to manufacturer of key control system for subsequent delivery to Owner.

1.06 COORDINATION

A. Coordinate layout and installation of floor-recessed door hardware with floor construction. Cast anchoring inserts into concrete.

B. Installation Templates: Distribute for doors, frames, and other work specified to be factory or shop prepared. Check Shop Drawings of other work to confirm that adequate provisions are made for locating and installing door hardware to comply with indicated requirements.

C. Security: Coordinate installation of door hardware, keying, and access control with Owner's security consultant.

D. Electrical System Roughing-In: Coordinate layout and installation of electrified door hardware with connections to power supplies and building safety and security systems.

1.07 WARRANTY

A. Manufacturer's standard form in which manufacturer agrees to repair or replace components of door hardware that fail in materials or workmanship within published warranty period.

1. Warranty does not cover damage or faulty operation due to improper installation, improper use or abuse.
2. Warranty Period: Beginning from date of Substantial Completion, for durations indicated in manufacturer's published listings.
    a. Mechanical Warranty
        1) Locks
            a) Schlage L Series: 10 years
            b) Schlage ND Series: 10 years
        2) Exit Devices
            a) Von Duprin: 10 years
        3) Closers
            a) LCN 4050 Series: 25 years
            b) Falcon SC Series: 10 years
    b. Electrical Warranty
        1) Locks
            a) Schlage: 3 years
        2) Exit Devices
            a) Von Duprin: 3 years

1.08 MAINTENANCE

A. Furnish complete set of special tools required for maintenance and adjustment of hardware, including changing of cylinders.

B. Turn over unused materials to Owner for maintenance purposes.

2.01 MANUFACTURERS

A. The Owner requires use of certain products for their unique characteristics and project suitability to ensure continuity of existing and future performance and maintenance standards. After investigating available product offerings, the Awarding Authority has elected to prepare proprietary specifications. These products are specified with the notation: "Owner's Standard."

1. Where "Owner's Standard" is noted, submittals and substitution requests for other products will not be considered.

B. Approval of alternate manufacturers and/or products other than those listed as "Scheduled Manufacturer" or "Acceptable Manufacturers" in the individual article for the product category are only to be considered by official substitution request in accordance with section 01 25 00.

C. Approval of products from manufacturers indicated in "Acceptable Manufacturers" is contingent upon those products providing all functions and features and meeting all requirements of scheduled manufacturer's product.

D. Where specified hardware is not adaptable to finished shape or size of members requiring hardware, furnish suitable types having same operation and quality as type specified, subject to Architect's approval.

2.02 MATERIALS

A. Fabrication

1. Provide door hardware manufactured to comply with published templates generally prepared for machine, wood, and sheet metal screws. provide screws according to manufacturer's recognized installation standards for application intended.
2. Finish exposed screws to match hardware finish, or, if exposed in surfaces of other work, to match finish of this other work including prepared for paint surfaces to receive painted finish.
3. Provide concealed fasteners wherever possible for hardware units exposed when door is closed. Coordinate with "Metal Doors and Frames", "Flush Wood Doors", "Stile and Rail Wood Doors" to ensure proper reinforcements. Advise the Architect where visible fasteners, such as thru bolts, are required.

B. Provide screws, bolts, expansion shields, drop plates and other devices necessary for hardware installation.

1. Where fasteners are exposed to view: Finish to match adjacent door hardware material.
2. Provide through-door wire harness for each electrified locking device installed in a door and wire harness for each electrified hinge, electrified continuous hinge, electrified pivot, and electric power transfer for connection to power supplies.

2.03 HINGES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Ives 5BB series

2. Acceptable Manufacturers and Products:
   a. Hager BB1191/1279 series
   b. Best FBB series

B. Requirements:

1. Provide hinges conforming to ANSI/BHMA A156.1.
2. Provide five knuckle, ball bearing hinges.
3. 1-3/4 inch (44 mm) thick doors, up to and including 36 inches (914 mm) wide:
   a. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high
   b. Interior: Standard weight, steel, 4-1/2 inches (114 mm) high

4. 1-3/4 inch (44 mm) thick doors over 36 inches (914 mm) wide:
   a. Interior: Heavy weight, steel, 5 inches (127 mm) high

5. Adjust hinge width for door, frame, and wall conditions to allow proper degree of opening.
6. Provide three hinges per door leaf for doors 90 inches (2286 mm) or less in height, and one additional hinge for each 30 inches (762 mm) of additional door height.
7. Hinge Pins: Except as otherwise indicated, provide hinge pins as follows:
   a. Steel Hinges: Steel pins
   b. Non-Ferrous Hinges: Stainless steel pins
   c. Out-Swinging Interior Lockable Doors: Non-removable pins
   d. Interior Non-lockable Doors: Non-rising pins

8. Provide hinges with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware. Locate electric hinge at second hinge from bottom or nearest to electrified locking component. Provide mortar guard for each electrified hinge specified.

2.04 CONTINUOUS HINGES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Select

B. Requirements:

1. Provide aluminum geared continuous hinges conforming to ANSI/BHMA A156.26, Grade 1.
2. Provide aluminum geared continuous hinges, where specified in the hardware sets, fabricated from 6063-T6 aluminum.
3. Provide split nylon bearings at each hinge knuckle for quiet, smooth, self-lubricating operation.
4. Provide hinges capable of supporting door weights up to 450 pounds, and successfully tested for 1,500,000 cycles.
5. On fire-rated doors, provide aluminum geared continuous hinges classified for use on rated doors by testing agency acceptable to authority having jurisdiction.

6. Provide aluminum geared continuous hinges with electrified option scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
7. Provide hinges 1 inch (25 mm) shorter in length than nominal height of door, unless otherwise noted or door details require shorter length and with symmetrical hole pattern.

2.05 ELECTRIC POWER TRANSFER

A. Manufacturers:

1. Scheduled Manufacturer and Product:
   a. Von Duprin EPT-10

2. Acceptable Manufacturers and Products:
   a. Owner’s Standard

B. Requirements:

1. Provide power transfer with electrified options as scheduled in the hardware sets. Provide with number and gage of wires enough to accommodate electric function of specified hardware.
2. Locate electric power transfer per manufacturer's template and UL requirements, unless interference with operation of door or other hardware items.

2.06 FLUSH BOLTS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Trimco

B. Requirements:

1. Provide automatic, constant latching, and manual flush bolts with forged bronze or stainless-steel face plates, extruded brass levers, and with wrought brass guides and strikes. Provide 12 inch (305 mm) steel or brass rods at doors up to 90 inches (2286 mm) in height. For doors over 90 inches (2286 mm) in height increase top rods by 6 inches (152 mm) for each additional 6 inches (152 mm) of door height. Provide dust-proof strikes at each bottom flush bolt.

2.07 COORDINATORS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns

b. Trimco

B. Requirements:

1. Where pairs of doors are equipped with automatic flush bolts, an astragal, or other hardware that requires synchronized closing of the doors, provide bar-type coordinating device, surface applied to underside of stop at frame head.
2. Provide filler bar of correct length for unit to span entire width of opening, and appropriate brackets for parallel arm door closers, surface vertical rod exit device strikes, or other stop mounted hardware. Factory-prepared coordinators for vertical rod devices as specified.

2.08 MORTISE LOCKS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage L9000 series

2. Acceptable Manufacturers and Products:
   a. Sargent 8200 series

B. Requirements:

1. Provide mortise locks conforming to ANSI/BHMA A156.13 Series 1000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide indicator window measuring a minimum 2-inch x 1/2 inch with 180-degree visibility. Provide messages color-coded with full text and/or symbols, as scheduled, for easy visibility.
3. Provide locks manufactured from heavy gauge steel, containing components of steel with a zinc dichromate plating for corrosion resistance.
4. Provide lock case that is multi-function and field reversible for handing without opening case. Cylinders: Refer to “KEYING” article, herein.
5. Provide locks with standard 2-3/4 inches (70 mm) backset with full 3/4 inch (19 mm) throw stainless steel mechanical anti-friction latchbolt. Provide deadbolt with full 1-inch (25 mm) throw, constructed of stainless steel.
6. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
7. Provide electrified options as scheduled in the hardware sets. Where scheduled, provide switches and sensors integrated into the locks and latches. Provide motor based electrified and motor based latch retraction locksets that comply with the following requirements:
   a. Universal input voltage – single chassis accepts 12 or 24VDC to allow for changes in the field without changing lock chassis.
   b. Fail Safe/Fail Secure – changing mode between electrically locked (fail safe) and electrically unlocked (fail secure) is field selectable without opening the lock case
   c. Low maximum current draw – maximum 0.4 amps (Lever control) and maximum 2.0 amps (Latch retraction) to allow for multiple locks on a single power supply.
   d. Low holding current (Lever control or latch retraction) – maximum 0.01 amps to produce minimal heat, eliminate “hot levers” in electrically locked applications and motorized latch retraction applications, and to provide reliable operation in wood doors that provide minimal ventilation and air flow.
   e. Connections – provide quick-connect Molex system standard.

8. Lever Trim: Solid brass, bronze, or stainless steel, cast or forged in design specified, with wrought roses and external lever spring cages. Provide thru-bolted levers with 2-piece spindles.
   a. Lever Design: 06A.

2.09 CYLINDRICAL LOCKS – GRADE 1

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage ND series

2. Acceptable Manufacturers and Products:
   a. Sargent 11-Line

B. Requirements:

1. Provide cylindrical locks conforming to ANSI/BHMA A156.2 Series 4000, Grade 1, and UL Listed for 3-hour fire doors.
2. Indicators: Where specified, provide escutcheon with lock status indicator window on top of lockset rose:
   a. Escutcheon height (including rose) 6.05 inches high by 3.68 inches wide.
   b. Indicator window measuring a minimum 3.52-inch by .60 inch with 1.92 square-inches of front facing viewing area and 180-degree visibility with a total of .236 square-inches of total viewable area.
   c. Provide snap-in serviceable window to prevent tampering. Lock must function if indicator is compromised.
   d. Provide messages color-coded with full text and symbol, as scheduled, for easy visibility.
   e. Unlocked and Unoccupied message will display on white background, and Locked and Occupied message will display on red background.
3. Cylinders: Refer to "KEYING" article, herein.
4. Provide locks with standard 2-3/4 inches (70 mm) backset, unless noted otherwise, with 1/2-inch latch throw. Provide proper latch throw for UL listing at pairs.
5. Provide locksets with separate anti-rotation thru-bolts, and no exposed screws.
6. Provide independently operating levers with two external return spring cassettes mounted under roses to prevent lever sag.
7. Provide standard ASA strikes unless extended lip strikes are necessary to protect trim.
8. Provide electrified options as scheduled in the hardware sets.
9. Lever Trim: Solid cast levers without plastic inserts and wrought roses on both sides.
   a. Lever Design: Rhodes.

2.10 EXIT DEVICES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Falcon 24/25 series

2. Acceptable Manufacturers and Products:
   a. Owner’s Standard

B. Requirements:

1. Provide exit devices tested to ANSI/BHMA A156.3 Grade 1 and UL listed for Panic Exit or Fire Exit Hardware.
2. Cylinders: Refer to "KEYING" article, herein.
3. Provide touchpad type exit devices, fabricated of brass, bronze, stainless steel, or aluminum, plated to standard architectural finishes to match balance of door hardware.
4. Touchpad must extend a minimum of one half of door width. No plastic inserts are allowed in touchpads.
5. Provide exit devices with deadlatching feature for security and for future addition of alarm kits and/or other electrified requirements.
6. Provide flush end caps for exit devices.
7. Provide exit devices with manufacturer's approved strikes.
8. Install exit devices at height recommended by exit device manufacturer, allowable by governing building codes, and approved by Architect.
9. Mount mechanism case flush on face of doors or provide spacers to fill gaps behind devices. Where glass trim or molding projects off face of door, provide glass bead kits.
10. Provide cylinder or hex-key dogging as specified at non fire-rated openings.
11. Removable Mullions: 2 inches (51 mm) x 3 inches (76 mm) steel tube. Where scheduled as keyed removable mullion, provide type that can be removed by use of a keyed cylinder, which is self-locking when re-installed.
12. Provide factory drilled weep holes for exit devices used in full exterior application, highly corrosive areas, and where noted in hardware sets.
13. Provide electrified options as scheduled.
14. Provide exit devices with optional trim designs to match other lever and pull designs used on the project.

2.11 ACCESS CONTROL READER

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage MTB Series

2. Acceptable Manufacturers and Products:
   a. Specified and furnished under Division #28.

B. Requirements:

1. Provide access control card readers manufactured by a global company who is a recognized leader in the production of access control devices. Card reader manufactured for non-access control applications are not acceptable.
2. Provide multi-technology contactless readers complying with ISO 14443.
3. Provide access control card readers capable of reading the following technologies:
   a. CSN - DESFire® CSN, HID iCLASS® CSN, Inside Contactless PicoTag® CSN, ST Microelectronics® CSN, Texas Instruments Tag-It®, CSN, Phillips I-Code® CSN
   b. 125 KHz proximity - Schlage® Proximity, HID® Proximity, GE/CASI® Proximity, AWID® Proximity, LenelProx®
   c. 13.56 MHz Smart card - Schlage smart cards using MIFARE Classic® EV1/EV3, Schlage smart cards using MIFARE Plus®, Schlage smart cards using MIFARE® DESFire® EV1/EV3, Schlage smart cards using MIFARE® DESFire® EV2/EV3
   d. 13.56 MHz NFC (mobile), 2.45 GHz Bluetooth (mobile) - Mobile means compatible with Bluetooth and NFC-enabled smartphones.

2.12 POWER SUPPLIES

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage/Von Duprin PS900 Series

2. Acceptable Manufacturers and Products:
   a. Owner's Standard

B. Requirements:

1. Provide power supplies approved by manufacturer of supplied electrified hardware.
2. Provide appropriate quantity of power supplies necessary for proper operation of electrified locking components as recommended by manufacturer of electrified locking components with consideration for each electrified component using power supply, location of power supply, and approved wiring diagrams. Locate power supplies as directed by Architect.
3. Provide regulated and filtered 24 VDC power supply, and UL class 2 listed.
4. Provide power supplies with the following features:
   a. 12/24 VDC Output, field selectable.
   b. Class 2 Rated power limited output.
   c. Universal 120-240 VAC input.
   d. Low voltage DC, regulated and filtered.
   e. Polarized connector for distribution boards.
   f. Fused primary input.
   g. AC input and DC output monitoring circuit w/LED indicators.
   h. Cover mounted AC Input indication.
   i. Tested and certified to meet UL294.
   j. NEMA 1 enclosure.
   k. Hinged cover w/lock down screws.
   l. High voltage protective cover.

2.13 CYLINDERS

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Schlage Everest 29 T

2. Acceptable Manufacturers and Products:
   a. Owner's Standard

B. Requirements:

1. Provide cylinders/cores compliant with ANSI/BHMA A156.5; latest revision; cylinder face finished to match lockset; manufacturer's series as indicated. Refer to "KEYING" article, herein.
2. Provide cylinders in the below-listed configuration(s), distributed throughout the Project as indicated.
   a. Patented Restricted: cylinder with permanent core with patented, restricted keyway.
   b. Patented Restricted: cylinder with interchangeable core with patented, restricted keyway.

3. Patent Protection: Cylinders/cores requiring use of restricted, patented keys, patent protected.
4. Nickel silver bottom pins.

2.14 KEYING

A. Scheduled System:

1. New factory registered system:
   a. Provide a factory registered keying system, complying with guidelines in ANSI/BHMA A156.28, incorporating decisions made at keying conference.

B. Requirements:

1. Construction Keying:
   a. Replaceable Construction Cores.
      1) Provide temporary construction cores replaceable by permanent cores, furnished in accordance with the following requirements.
         a) 3 construction control keys
         b) 12 construction change (day) keys.
      2) Owner or Owner's Representative will replace temporary construction cores with permanent cores.

2. Permanent Keying:
   a. Provide permanent cylinders/cores keyed by the manufacturer according to the following key system.
      1) Master Keying system as directed by the Owner.
   b. Forward bitting list and keys separately from cylinders, by means as directed by Owner. Failure to comply with forwarding requirements will be cause for replacement of cylinders/cores involved at no additional cost to Owner.
   c. Provide keys with the following features:
      1) Material: Nickel silver; minimum thickness of .107-inch (2.3mm)
      2) Patent Protection: Keys and blanks protected by one or more utility patent(s).
      3) Geographically Exclusive: Where High Security or Security cylinders/cores are indicated, provide nationwide, geographically exclusive key system complying with the following restrictions.
   d. Identification:
      1) Mark permanent cylinders/cores and keys with applicable blind code for identification. Do not provide blind code marks with actual key cuts.
      2) Identification stamping provisions must be approved by the Architect and Owner.
      3) Stamp cylinders/cores and keys with Owner's unique key system facility code as established by the manufacturer; key symbol and embossed or stamped with "DO NOT DUPLICATE" along with the "PATENTED" or patent number to enforce the patent protection.
      4) Failure to comply with stamping requirements will be cause for replacement of keys involved at no additional cost to Owner.
      5) Forward permanent cylinders/cores to Owner, separately from keys, by means as directed by Owner.
   e. Quantity: Furnish in the following quantities.
      1) Permanent Control Keys: 3.
      2) Master Keys: 6.
      3) Change (Day) Keys: 3 per cylinder/core that is keyed differently
      4) Key Blanks: Quantity as determined in the keying meeting.

2.15 KEY CONTROL SYSTEM

A. Manufacturers:

1. Scheduled Manufacturer:

a. Telkee

2. Acceptable Manufacturers:
   a. HPC
   b. Lund

B. Requirements:

1. Provide key control system, including envelopes, labels, tags with self-locking key clips, receipt forms, 3-way visible card index, temporary markers, permanent markers, and standard metal cabinet, all as recommended by system manufacturer, with capacity for 150% of number of locks required for Project.
   a. Provide complete cross index system set up by hardware supplier, and place keys on markers and hooks in cabinet as determined by final key schedule.
   b. Provide hinged-panel type cabinet for wall mounting.

2.16 DOOR CLOSERS (Aluminum Storefront Doors)

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. LCN 4050A series

2. Acceptable Manufacturers and Products:
   a. Owner's Standard

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with cast aluminum cylinder.
3. Closer Body: 1-1/2-inch (38 mm) diameter with 11/16-inch (17 mm) diameter heat-treated pinion journal and full complement bearings.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and all weather requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and back check.
7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide stick on templates, special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.17 DOOR CLOSERS (Interior Doors)

A. Manufacturers and Products:

1. Scheduled Manufacturer and Product:
   a. Falcon SC70A series

2. Acceptable Manufacturers and Products:
   a. Owner's Standard

B. Requirements:

1. Provide door closers conforming to ANSI/BHMA A156.4 Grade 1 requirements by BHMA certified independent testing laboratory. ISO 9000 certify closers. Stamp units with date of manufacture code.
2. Provide door closers with fully hydraulic, full rack and pinion action with aluminum cylinder.
3. Closer Body: 1-1/2-inch (38 mm) diameter with 5/8-inch (16 mm) diameter heat-treated pinion journal.
4. Hydraulic Fluid: Fireproof, passing requirements of UL10C, and requiring no seasonal closer adjustment for temperatures ranging from 120 degrees F to -30 degrees F.
5. Spring Power: Continuously adjustable over full range of closer sizes, and providing reduced opening force as required by accessibility codes and standards.
6. Hydraulic Regulation: By tamper-proof, non-critical valves, with separate adjustment for latch speed, general speed, and backcheck.
7. Pressure Relief Valve (PRV) Technology: Not permitted.
8. Provide special templates, drop plates, mounting brackets, or adapters for arms as required for details, overhead stops, and other door hardware items interfering with closer mounting.

2.18 DOOR TRIM

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Trimco

B. Requirements:

1. Provide push plates, push bars, pull plates, pulls, and hands-free reversible door pulls with diameter and length as scheduled.

2.19 PROTECTION PLATES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Trimco

B. Requirements:

1. Provide protection plates with a minimum of 0.050 inch (1 mm) thick, beveled four edges as scheduled. Furnish with sheet metal or wood screws, finished to match plates.

2. Sizes plates 2 inches (51 mm) less width of door on single doors, pairs of doors with a mullion, and doors with edge guards. Size plates 1 inch (25 mm) less width of door on pairs without a mullion or edge guards.
3. At fire rated doors, provide protection plates over 16 inches high with UL label.

2.20 OVERHEAD STOPS AND OVERHEAD STOP/HOLDERS

A. Manufacturers:

1. Scheduled Manufacturers:
   a. Glynn-Johnson

2. Acceptable Manufacturers:
   a. Rixson

B. Requirements:

1. Provide overhead stop at any door where conditions do not allow for a wall stop or floor stop presents tripping hazard.

2.21 DOOR STOPS AND HOLDERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Trimco

B. Provide door stops at each door leaf:

1. Provide wall stops wherever possible. Provide concave type where lockset has a push button of thumbturn.
2. Where a wall stop cannot be used, provide universal floor stops.
3. Where wall or floor stop cannot be used, provide overhead stop.
4. Provide roller bumper where doors open into each other and overhead stop cannot be used.

2.22 SILENCERS

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Ives

2. Acceptable Manufacturers:
   a. Burns
   b. Trimco

B. Requirements:

1. Provide "push-in" type silencers for hollow metal or wood frames.
2. Provide one silencer per 30 inches (762 mm) of height on each single frame, and two for each pair frame.
3. Omit where gasketing is specified.

2.23 THRESHOLDS, SEALS, DOOR SWEEPS, AUTOMATIC DOOR BOTTOMS, AND GASKETING

A. Scheduled Manufacturer:

1. Zero International

B. Acceptable Manufacturers:

1. National Guard
2. Reese

C. Seals and Gasketing: Provide continuous gasketing on exterior openings, to the head and jambs, forming a continuous seal between the door and the frame. Provide smoke, light, or sound gasketing on interior doors where indicated.

1. Provide self-tapping fasteners for aluminum extruded gasketing being applied to hollow metal frames.
   a. Provide non-corrosive fasteners for all exterior applications.
   b. Provide security fasteners where indicated.

2. Provide neoprene, EPDM, silicone, or nylon brush inserts as specified in hardware sets. Provide non brush inserts of solid or sponge cell, as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.

D. Smoke Labeled Gasketing: At all smoke labeled openings, provide smoke listed perimeter gasketing assemblies complying with NFPA 105 listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction for smoke control ratings indicated based on testing according to UL 1784.

E. Fire Listed Gasketing: Assemblies complying with NFPA 80 that are listed by a testing and inspecting agency acceptable to authorities having jurisdiction for fire ratings indicated based on testing according to UL-10C.

1. Where frame-applied intumescent seals are required by the manufacturer, provide gaskets that comply with UL10C Standard for Positive Pressure Fire Tests of Door Assemblies and UBC 7-2, Fire Tests of Door Assemblies.

F. Sound-Rated Gasketing: Provide acoustic gasketing to meet Sound Transmission Class (STC) rating required.

G. Meeting-Stile Gasketing: Provide meeting-stile gasketing that fastens to the meeting stiles forming a continuous seal when doors are closed.

H. Door Sweeps or Shoes: Apply to the bottom of the door to close the gap between the door bottom and finished floor or saddle threshold.

1. Provide solid neoprene, EPDM, silicone, or nylon brush type of seal as specified in hardware sets. Vinyl inserts are not allowed except where specified in hardware sets.

I. Automatic Door Bottoms:

1. Provide closed cell sponge, bulb neoprene. or EPDM type of seal as specified in hardware sets.
2. Door bottom to be mortised, semi mortised, or surface mount as with a minimum thickness as specified in hardware sets.

J. Rain Drips:

1. Provide overhead rain drips for out-swinging hollow metal doors that are not covered against 45 degree blowing rain. Aluminum extrusion to be a minimum of .088 inches thick and extend 2.50 inches from the face of the frame, in anodized finish to match door.
2. Door sweeps or shoes with integral rain drip must meet ADA requirements

K. Thresholds: Provide threshold units not less than 4 inches wide, formed to accommodate change in floor elevation where indicated, and fabricated to accommodate door hardware and fit door frames.

1. Threshold extrusion to be a minimum thickness as specified in hardware sets.

2.24 DOOR POSITION SWITCHES

A. Manufacturers:

1. Scheduled Manufacturer:
   a. Schlage

2. Acceptable Manufacturers:
   a. GE-Interlogix

B. Requirements:

1. Provide recessed or surface mounted type door position switches as specified.
2. Coordinate door and frame preparations with door and frame suppliers. If switches are being used with magnetic locking device, provide minimum of 4 inches (102 mm) between switch and magnetic locking device.

2.25 FINISHES

A. FINISH: BHMA 626/652 (US26D); EXCEPT:

1. Hinges at Exterior Doors: BHMA 630 (US32D)
2. Aluminum Geared Continuous Hinges: BHMA 628 (US28)
3. Push Plates, Pulls, and Push Bars: BHMA 630 (US32D)
4. Protection Plates: BHMA 630 (US32D)
5. Overhead Stops and Holders: BHMA 630 (US32D)
6. Door Closers: Powder Coat to Match
7. Wall Stops: BHMA 630 (US32D)
8. Latch Protectors: BHMA 630 (US32D)
9. Weatherstripping: Clear Anodized Aluminum
10. Thresholds: Mill Finish Aluminum

PART 3 - EXECUTION

3.01 EXAMINATION

A. Prior to installation of hardware, examine doors and frames, with Installer present, for compliance with requirements for installation tolerances, labeled fire-rated door assembly construction, wall and floor construction, and other conditions affecting performance. Verify doors, frames, and walls have been properly reinforced for hardware installation.

B. Examine roughing-in for electrical power systems to verify actual locations of wiring connections before electrified door hardware installation.

C. Submit a list of deficiencies in writing and proceed with installation only after unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. Mount door hardware units at heights to comply with the following, unless otherwise indicated or required to comply with governing regulations.

1. Standard Steel Doors and Frames: ANSI/SDI A250.8.
2. Custom Steel Doors and Frames: HMMA 831.
3. Interior Architectural Wood Flush Doors: ANSI/WDMA I.S. 1A
4. Installation Guide for Doors and Hardware: DHI TDH-007-20

B. Install door hardware in accordance with NFPA 80, NFPA 101 and provide post-install inspection, testing as specified in section 1.03.E unless otherwise required to comply with governing regulations.

C. Install each hardware item in compliance with manufacturer's instructions and recommendations, using only fasteners provided by manufacturer.

D. Do not install surface mounted items until finishes have been completed on substrate. Protect all installed hardware during painting.

E. Set units level, plumb and true to line and location. Adjust and reinforce attachment substrate as necessary for proper installation and operation.

F. Drill and countersink units that are not factory prepared for anchorage fasteners. Space fasteners and anchors according to industry standards.

G. Install operating parts so they move freely and smoothly without binding, sticking, or excessive clearance.

H. Hinges: Install types and in quantities indicated in door hardware schedule but not fewer than quantity recommended by manufacturer for application indicated.

I. Lock Cylinders:

1. Install construction cores to secure building and areas during construction period.
2. Replace construction cores with permanent cores as indicated in keying section.
3. Furnish permanent cores to Owner for installation.

J. Wiring: Coordinate with Division 26, ELECTRICAL and Division 28 ELECTRONIC SAFETY AND SECURITY sections for:

1. Conduit, junction boxes and wire pulls.
2. Connections to and from power supplies to electrified hardware.
3. Connections to fire/smoke alarm system and smoke evacuation system.
4. Connection of wire to door position switches and wire runs to central room or area, as directed by Architect.
5. Connections to panel interface modules, controllers, and gateways.
6. Testing and labeling wires with Architect's opening number.

K. Key Control System: Tag keys and place them on markers and hooks in key control system cabinet, as determined by final keying schedule.

L. Continuous Hinges: Re-locate the door and frame fire rating labels where they will remain visible so that the hinge does not cover the label once installed.

M. Door Closers & Auto Operators: Mount closers/operators on room side of corridor doors, inside of exterior doors, and stair side of stairway doors from corridors. Mount closers/operators so they are not visible in corridors, lobbies and other public spaces unless approved by Architect.

N. Overhead Stops/Holders: Mount overhead stops/holders on room side of corridor doors, inside of exterior doors, and stair side of stairway doors.

O. Power Supplies: Locate power supplies as indicated or, if not indicated, above accessible ceilings or in equipment room, or alternate location as directed by Architect.

P. Thresholds:

1. Set thresholds in full bed of sealant complying with requirements specified in Division 07 Section "Joint Sealants."
2. Aluminum thresholds to be cut-in, and scribed around mullions, frame members, and stops. Do not butt to thresholds. Provide a continuous surface across full width of opening from jamb to jamb.
3. Where aluminum panic-type (rabbeted) thresholds with neoprene inserts are specified, undercut doors as required to properly mate with seal in threshold.

Q. Stops: Provide floor stops for doors unless wall or other type stops are indicated in door hardware schedule. Do not mount floor stops where they may impede traffic or present tripping hazard.

R. Perimeter Gasketing:

1. Apply to head and jamb, forming seal between door and frame.
2. Install gasketing in a manner eliminating need to cut any seal to install surface mounted hardware. Install compatible mounting bracket for surface mounted hardware unless minimum 1/4 inch thick solid aluminum seals are provided for mounting of surface applied hardware.

S. Meeting Stile Gasketing: Fasten to meeting stiles, forming seal when doors are closed.

T. Door Bottoms and Sweeps: Apply to bottom of door, forming seal with threshold when door is closed.

3.03 ADJUSTING

A. Initial 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.

   1. Door Closers: Adjust sweep period to comply with accessibility requirements and requirements of authorities having jurisdiction.

B. Occupancy Adjustment: Approximately three to six months after date of Substantial Completion, examine and readjust each item of door hardware, including adjusting operating forces, as necessary to ensure function of doors and door hardware.

3.04 CLEANING AND PROTECTION

A. Clean adjacent surfaces soiled by door hardware installation.

B. Clean operating items per manufacturer's instructions to restore proper function and finish.

C. Provide final protection and maintain conditions that ensure door hardware is without damage or deterioration at time of Substantial Completion.

3.05 DOOR HARDWARE SCHEDULE

A. The intent of the hardware specification is to specify the hardware for interior and exterior doors, and to establish a type, continuity, and standard of quality. However, it is the door hardware supplier's responsibility to thoroughly review existing conditions, schedules, specifications, drawings, and other Contract Documents to verify the suitability of the hardware specified.

B. Discrepancies, conflicting hardware, and missing items are to be brought to the attention of the architect with corrections made prior to the bidding process. Omitted items not included in a hardware set should be scheduled with the appropriate additional hardware required for proper application.

SECTION 088000 - GLAZING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:
   1. Interior Doors.
   2. Storefront framing.
   3. Glazed entrances.
   4. Interior borrowed lites.

B. Related Sections:

1.3 DEFINITIONS

A. Glass Manufacturers: Firms that produce primary glass, fabricated glass, or both, as defined in referenced glazing publications.

B. Glass Thicknesses: Indicated by thickness designations in millimeters according to ASTM C 1036.

C. Interspace: Space between lites of an insulating-glass unit.

1.4 PERFORMANCE REQUIREMENTS

A. General: Installed glazing systems shall withstand normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, or installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.

B. Delegated Design: Design glass, including comprehensive engineering analysis according to ASTM E 1300 by a qualified professional engineer, using the following design criteria:
   1. Design Wind Pressures: As indicated on Drawings.
   2. Design Wind Pressures: Determine design wind pressures applicable to Project according to ASCE/SEI 7, based on heights above grade indicated on Drawings.
      a. Wind Design Data: As indicated on Drawings.
   3. Design Snow Loads: As indicated on Drawings.
   4. Vertical Glazing: For glass surfaces sloped 15 degrees or less from vertical, design glass to resist design wind pressure based on glass type factors for short-duration load.
   5. Maximum Lateral Deflection: For glass supported on all four edges, limit center-of-glass deflection at design wind pressure to not more than 1/50 times the short-side length or 1 inch, whichever is less.

C. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes acting on glass framing members and glazing components.
   1. Temperature Change: 120 deg F, ambient; 180 deg F, material surfaces.

1.5 PRECONSTRUCTION TESTING

A. Preconstruction Adhesion and Compatibility Testing: Test each glazing material type, tape sealant, gasket, glazing accessory, and glass-framing member for adhesion to and compatibility with elastomeric glazing sealants.
   1. Testing will not be required if data are submitted based on previous testing of current sealant products and glazing materials matching those submitted.
   2. Use ASTM C 1087 to determine whether priming and other specific joint-preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
   3. Test no fewer than three Samples of each type of material, including joint substrates, shims, sealant backings, secondary seals, and miscellaneous materials.
   4. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
   5. For materials failing tests, submit sealant manufacturer's written instructions for corrective measures including the use of specially formulated primers.

1.6 SUBMITTALS

A. Product Data: For each glass product and glazing material indicated.

B. Glass Samples: For each type of glass product other than clear monolithic vision glass ; 12 inches square.
   1. Coated glass.
   2. Fire-resistive glazing products.
   3. Insulating glass.

C. Glazing Accessory Samples: For gaskets and colored spacers, in 12-inch lengths. Install sealant Samples between two strips of material representative in color of the adjoining framing system.

D. Delegated-Design Submittal: For glass indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

E. Qualification Data: For installers manufacturers of insulating-glass units with , low-e coatings glass testing agency and sealant testing agency.

F. Product Certificates: For glass and glazing products, from manufacturer.

G. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for coated glass insulating glass glazing sealants and glazing gaskets.
   1. For glazing sealants, provide test reports based on testing current sealant formulations within previous 36-month period.

H. Preconstruction adhesion and compatibility test report.

I. Warranties: Sample of special warranties.

1.7 QUALITY ASSURANCE

A. Manufacturer Qualifications for Insulating-Glass Units with , Low-E Coatings: A qualified insulating-glass manufacturer who is approved and certified by coated-glass manufacturer.

B. Installer Qualifications: A qualified installer who employs glass installers for this Project who are certified under the National Glass Association's Certified Glass Installer Program.

C. Glass Testing Agency Qualifications: A qualified independent testing agency accredited according to the NFRC CAP 1 Certification Agency Program.

D. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated.

E. Source Limitations for Glass: Obtain coated float glass and insulating glass from single source from single manufacturer for each glass type.

F. Source Limitations for Glazing Accessories: Obtain from single source from single manufacturer for each product and installation method.

G. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.
   1. GANA Publications: GANA's "Glazing Manual."
   2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
   3. IGMA Publication for Sloped Glazing: IGMA TB-3001, "Guidelines for Sloped Glazing."
   4. IGMA Publication for Insulating Glass: SIGMA TM-3000, "North American Glazing Guidelines for Sealed Insulating Glass Units for Commercial and Residential Use."

H. Safety Glazing Labeling: Where safety glazing labeling is indicated, permanently mark glazing with certification label of the SGCC or another certification agency acceptable to authorities having jurisdiction or the manufacturer]. Label shall indicate manufacturer's name, type of glass, thickness, and safety glazing standard with which glass complies.

I. Fire-Protection-Rated Glazing Labeling: Permanently mark fire-protection-rated glazing with certification label of a testing agency acceptable to authorities having jurisdiction. Label shall indicate manufacturer's name, test standard, whether glazing is for use in fire doors or other openings, whether or not glazing passes hose-stream test, whether or not glazing has a temperature rise rating of 450 deg F, and the fire-resistance rating in minutes.

J. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of IGCC.

K. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
   1. Install glazing in mockups specified in Division 08 Section"Aluminum-Framed Entrances and Storefronts Division 08 Hollow Metal Frames & Flush Wood Doors" to match glazing systems required for Project, including glazing methods.
   2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

L. Preinstallation Conference: Conduct conference at Project site .
   1. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
   2. Review temporary protection requirements for glazing during and after installation.

1.8 DELIVERY, STORAGE, AND HANDLING

A. Protect glazing materials according to manufacturer's written instructions. Prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.

B. Comply with insulating-glass manufacturer's written recommendations for venting and sealing units to avoid hermetic seal ruptures due to altitude change.

1.9 PROJECT CONDITIONS

A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
   1. Do not install glazing sealants when ambient and substrate temperature conditions are outside limits permitted by sealant manufacturer or below 40 deg F.

1.10 WARRANTY

A. Manufacturer's Special Warranty for Coated-Glass Products: Manufacturer's standard form in which coated-glass manufacturer agrees to replace coated-glass units that deteriorate within specified warranty period. Deterioration of coated glass is defined as defects developed from normal use that are not attributed to glass breakage or to maintaining and cleaning coated glass contrary to manufacturer's written instructions. Defects include peeling, cracking, and other indications of deterioration in coating.
   1. Warranty Period: 10 years from date of Substantial Completion.

B. Manufacturer's Special Warranty on Insulating Glass: Manufacturer's standard form in which insulating-glass manufacturer agrees to replace insulating-glass units that deteriorate within specified warranty period. Deterioration of insulating glass is defined as failure of hermetic seal under normal use that is not attributed to glass breakage or to maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.
   1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 GLASS PRODUCTS, GENERAL

A. Thickness: Where glass thickness is indicated, it is a minimum. Provide glass lites in thicknesses as needed to comply with requirements indicated.
   1. Minimum Glass Thickness for Exterior Lites: Not less than 6.0 mm.

B. Strength: Where float glass is indicated, provide annealed float glass, Kind HS heat-treated float glass, or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where heat-strengthened glass is indicated, provide Kind HS heat-treated float glass or Kind FT heat-treated float glass as needed to comply with "Performance Requirements" Article. Where fully tempered glass is indicated, provide Kind FT heat-treated float glass.

C. Thermal and Optical Performance Properties: Provide glass with performance properties specified, as indicated in manufacturer's published test data, based on procedures indicated below:
   1. For monolithic-glass lites, properties are based on units with lites 6.0 mm thick .
   2. For insulating-glass units, properties are based on units of thickness indicated for overall unit and for each lite.
   3. 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.
   4. 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.
   5. Visible Reflectance: Center-of-glazing values, according to NFRC 300.

2.2 GLASS PRODUCTS

A. Float Glass: ASTM C 1036, Type I, Quality-Q3, Class I (clear) unless otherwise indicated.
   1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
      a. AFG Industries, Inc.; Krystal Klear.
      b. Guardian Industries Corp.; Ultrawhite.
      c. Pilkington North America; Optiwhite.
      d. PPG Industries, Inc.; Starphire.
      e. Viracon.

B. Heat-Treated Float Glass: ASTM C 1048; Type I; Quality-Q3; Class I (clear) unless otherwise indicated; of kind and condition indicated.
   1. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed unless otherwise indicated.
   2. For uncoated glass, comply with requirements for Condition A.
   3. For coated vision glass, comply with requirements for Condition C (other coated glass).

C. Reflective-Coated Vision Glass: ASTM C 1376 and complying with other requirements specified.
   1. Basis-of-Design Product: Subject to compliance with requirements, provide **Guardian SNX 62/27**. Products by other manufacturers that meet the specified performance requirements are also acceptable.

D. Spandrel Glass:
   1. Basis-of-Design Product: Subject to compliance with requirements, provide **Glass Coatings & Concepts LLC, Warm Gray SX3524E808**. Products by other manufacturers that meet the specified performance requirements are also acceptable.

2.3 FIRE-PROTECTION-RATED GLAZING

A. Fire-Protection-Rated Glazing, General: Listed and labeled by a testing agency acceptable to authorities having jurisdiction, for fire-protection ratings indicated, based on testing according to NFPA 252 for door assemblies and NFPA 257 for window assemblies.

B. Fire-Protection-Rated Tempered Glass: 1/4-inch- (6.4-mm-) thick, fire-protection-rated tempered glass, complying with testing requirements in 16 CFR 1201 for Category II materials.

2.4 GLAZING GASKETS

A. Dense Compression Gaskets: Molded or extruded gaskets of profile and hardness required to maintain watertight seal, made from one of the following:
   1. Silicone complying with ASTM C 1115.

B. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned silicone gaskets complying with ASTM C 509, Type II, black; of profile and hardness required to maintain watertight seal.
   1. Application: Use where soft compression gaskets will be compressed by inserting dense compression gaskets on opposite side of glazing or pressure applied by means of pressure-glazing stops on opposite side of glazing.

C. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock-strips, complying with ASTM C 542, black.

2.5 GLAZING SEALANTS

A. General:
   1. Compatibility: Provide glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
   2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
   3. VOC Content: For sealants used inside of the weatherproofing system, not more than 250 g/L when calculated according to 40 CFR 59, Subpart D.
   4. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range.

B. Glazing Sealant: Neutral-curing silicone glazing sealant complying with ASTM C 920, Type S, Grade NS, Class 100/50, Use NT.
   1. Products: Subject to compliance with requirements, provide one of the following available products that may be incorporated into the Work include, but are not limited to, the following:
      a. Dow Corning Corporation; 790.
      b. GE Advanced Materials - Silicones; SilPruf LM SCS2700.
      c. May National Associates, Inc.; Bondaflex Sil 290.
      d. Pecora Corporation; 890.
      e. Sika Corporation, Construction Products Division; SikaSil-C990.
      f. Tremco Incorporated; Spectrem 1.
      g. .
   2. Applications: Describe types of glazing applications where this sealant is required.

C. Glazing Sealants for Fire-Rated Glazing Products: Products that are approved by testing agencies that listed and labeled fire-resistant glazing products with which they are used for applications and fire-protection ratings indicated.

2.6 MISCELLANEOUS GLAZING MATERIALS

A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.

C. Setting Blocks: Elastomeric material with a Shore, Type A durometer hardness of 85, plus or minus 5.

D. Spacers: Elastomeric blocks or continuous extrusions of hardness required by glass manufacturer to maintain glass lites in place for installation indicated.

E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).

F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.

G. Perimeter Insulation for Fire-Resistive Glazing: Product that is approved by testing agency that listed and labeled fire-resistant glazing product with which it is used for application and fire-protection rating indicated.

2.7 FABRICATION OF GLAZING UNITS

A. Fabricate glazing units in sizes required to fit openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing publications, to comply with system performance requirements.

B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites to produce square edges with slight chamfers at junctions of edges and faces.

C. Grind smooth and polish exposed glass edges and corners.

2.8 MONOLITHIC-GLASS TYPES

A. Glass Type : Clear fully tempered float glass.
1. Thickness: 6.0 mm .
2. Provide safety glazing labeling.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine framing, glazing channels, and stops, with Installer present, for compliance with the following:
1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
2. Presence and functioning of weep systems.
3. Minimum required face and edge clearances.
4. Effective sealing between joints of glass-framing members.

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

3.2 PREPARATION

A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

B. Examine glazing units to locate exterior and interior surfaces. Label or mark units as needed so that exterior and interior surfaces are readily identifiable. Do not use materials that will leave visible marks in the completed work.

3.3 GLAZING, GENERAL

A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.

B. Adjust glazing channel dimensions as required by Project conditions during installation to provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances.

C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.

D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction testing.

E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.

F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.

G. Provide spacers for glass lites where length plus width is larger than 50 inches.
   1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
   2. Provide 1/8-inch minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.

H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.

I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.

J. Set glass lites with proper orientation so that coatings face exterior or interior as specified.

K. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

L. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.

B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.

C. Cover vertical framing joints by applying tapes to heads and sills first and then to jambs. Cover horizontal framing joints by applying tapes to jambs and then to heads and sills.

D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.

E. Do not remove release paper from tape until right before each glazing unit is installed.

F. Apply heel bead of elastomeric sealant.

G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.

H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.5 GASKET GLAZING (DRY)

A. Cut compression gaskets to lengths recommended by gasket manufacturer to fit openings exactly, with allowance for stretch during installation.

B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.

C. Installation with Drive-in Wedge Gaskets: Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

D. Installation with Pressure-Glazing Stops: Center glass lites in openings on setting blocks and press firmly against soft compression gasket. Install dense compression gaskets and pressure-glazing stops, applying pressure uniformly to compression gaskets. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.

E. Install gaskets so they protrude past face of glazing stops.

3.6 CLEANING AND PROTECTION

A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels and clean surfaces.

B. Protect glass from contact with contaminating substances resulting from construction operations. If, despite such protection, contaminating substances do come into contact with glass, remove substances immediately as recommended in writing by glass manufacturer.

C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for buildup of dirt, scum, alkaline deposits, or stains; remove as recommended in writing by glass manufacturer.

D. Remove and replace glass that is broken, chipped, cracked, or abraded or that is damaged from natural causes, accidents, and vandalism, during construction period.

E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended in writing by glass manufacturer.

END OF SECTION 088000

SECTION 092216 - NON-STRUCTURAL METAL FRAMING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Non-load-bearing steel framing systems for interior gypsum board assemblies.
   2. Suspension systems for interior gypsum ceilings, soffits, and grid systems.

B. Related Requirements:
   1. Division 05 Section "Cold-Formed Metal Framing" for exterior and interior load-bearing and exterior non-load-bearing wall studs; floor joists; roof rafters and ceiling joists; and roof trusses.

1.3 ACTION SUBMITTALS

A. Product Data: For each type of product.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For fire-resistance-rated assemblies that incorporate non-load-bearing steel framing, provide materials and construction identical to those tested in assembly indicated, according to ASTM E 119 by an independent testing agency.

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.

2.2 FRAMING SYSTEMS

A. Framing Members, General: Comply with ASTM C 754 for conditions indicated.
   1. Steel Sheet Components: Comply with ASTM C 645 requirements for metal unless otherwise indicated.
   2. Protective Coating: ASTM A 653/A 653M, G40 (Z120) , hot-dip galvanized unless otherwise indicated.

B. Studs and Runners: ASTM C 645. Use either steel studs and runners or dimpled steel studs and runners.
   1. Steel Studs and Runners:

a. Minimum Base-Metal Thickness: As indicated on Drawings .
b. Depth: As indicated on Drawings .

2. Dimpled Steel Studs and Runners:
a. Minimum Base-Metal Thickness: As indicated on Drawings .
b. Depth: As indicated on Drawings .

C. Slip-Type Head Joints: Where indicated, provide one of the following:
1. Double-Runner System: ASTM C 645 top runners, inside runner with 2-inch- (51-mm-) deep flanges in thickness not less than indicated for studs and fastened to studs, and outer runner sized to friction fit inside runner.
2. Deflection Track: Steel sheet top runner manufactured to prevent cracking of finishes applied to interior partition framing resulting from deflection of structure above; in thickness not less than indicated for studs and in width to accommodate depth of studs.
a. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
1) Dietrich Metal Framing; SLP-TRK Slotted Deflection Track.
2) MBA Building Supplies; Slotted Deflecto Track.
3) Superior Metal Trim; Superior Flex Track System (SFT).

D. Firestop Tracks: Top runner manufactured to allow partition heads to expand and contract with movement of the structure while maintaining continuity of fire-resistance-rated assembly indicated; in thickness not less than indicated for studs and in width to accommodate depth of studs.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
a. Fire Trak Corp.; Fire Trak System attached to studs with Fire Trak Posi Klip.
b. Grace Construction Products; FlameSafe FlowTrak System.
c. Metal-Lite, Inc.; The System.

E. Hat-Shaped, Rigid Furring Channels: ASTM C 645.
1. Minimum Base-Metal Thickness: As indicated on Drawings .
2. Depth: As indicated on Drawings .

F. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), minimum uncoated-metal thickness of 0.018 inch (0.45 mm), and depth required to fit insulation thickness indicated.

2.3 SUSPENSION SYSTEMS

A. Tie Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.062-inch- (1.59-mm-) diameter wire, or double strand of 0.048-inch- (1.21-mm-) diameter wire.

B. Hanger Attachments to Concrete:
1. Anchors: Fabricated from corrosion-resistant materials with holes or loops for attaching wire hangers and capable of sustaining, without failure, a load equal to 5 times that imposed by construction as determined by testing according to ASTM E 488 by an independent testing agency.
a. Type: Postinstalled, expansion anchor.

C. Wire Hangers: ASTM A 641/A 641M, Class 1 zinc coating, soft temper, 0.16 inch (4.12 mm) in diameter.

2.4 AUXILIARY MATERIALS

A. General: Provide auxiliary materials that comply with referenced installation standards.
   1. Fasteners for Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten steel members to substrates.

B. Isolation Strip at Exterior Walls: Provide the following:
   1. Foam Gasket: Adhesive-backed, closed-cell vinyl foam strips that allow fastener penetration without foam displacement, 1/8 inch (3.2 mm) thick, in width to suit steel stud size.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates, with Installer present, and including welded hollow-metal frames, cast-in anchors, and structural framing, for compliance with requirements and other conditions affecting performance of the Work.

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

3.2 PREPARATION

A. Suspended Assemblies: Coordinate installation of suspension systems with installation of overhead structure to ensure that inserts and other provisions for anchorages to building structure have been installed to receive hangers at spacing required to support the Work and that hangers will develop their full strength.
   1. Furnish concrete inserts and other devices indicated to other trades for installation in advance of time needed for coordination and construction.

B. Coordination with Sprayed Fire-Resistive Materials:
   1. Before sprayed fire-resistive materials are applied, attach offset anchor plates or ceiling runners (tracks) to surfaces indicated to receive sprayed fire-resistive materials. Where offset anchor plates are required, provide continuous plates fastened to building structure not more than 24 inches (610 mm) o.c.
   2. After sprayed fire-resistive materials are applied, remove them only to extent necessary for installation of non-load-bearing steel framing. Do not reduce thickness of fire-resistive materials below that required for fire-resistance ratings indicated. Protect adjacent fire-resistive materials from damage.

3.3 INSTALLATION, GENERAL

A. Installation Standard: ASTM C 754.
   1. Gypsum Plaster Assemblies: Also comply with requirements in ASTM C 841 that apply to framing installation.
   2. Portland Cement Plaster Assemblies: Also comply with requirements in ASTM C 1063 that apply to framing installation.
   3. Gypsum Veneer Plaster Assemblies: Also comply with requirements in ASTM C 844 that apply to framing installation.
   4. Gypsum Board Assemblies: Also comply with requirements in ASTM C 840 that apply to framing installation.

B. Install supplementary framing, and blocking to support fixtures, equipment services, heavy trim, grab bars, toilet accessories, furnishings, or similar construction.

C. Install bracing at terminations in assemblies.

D. Do not bridge building control and expansion joints with non-load-bearing steel framing members. Frame both sides of joints independently.

3.4 INSTALLING FRAMED ASSEMBLIES

A. Install framing system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Single-Layer Application: 16 inches (406 mm) o.c. unless otherwise indicated.
2. Tile Backing Panels: 16 inches (406 mm) o.c. unless otherwise indicated.

B. Where studs are installed directly against exterior masonry walls or dissimilar metals at exterior walls, install isolation strip between studs and exterior wall.

C. Install studs so flanges within framing system point in same direction.

D. Install tracks (runners) at floors and overhead supports. Extend framing full height to structural supports or substrates above suspended ceilings except where partitions are indicated to terminate at suspended ceilings. Continue framing around ducts penetrating partitions above ceiling.
1. Slip-Type Head Joints: Where framing extends to overhead structural supports, install to produce joints at tops of framing systems that prevent axial loading of finished assemblies.
2. Door Openings: Screw vertical studs at jambs to jamb anchor clips on door frames; install runner track section (for cripple studs) at head and secure to jamb studs.
    a. Install two studs at each jamb unless otherwise indicated.
    b. Install cripple studs at head adjacent to each jamb stud, with a minimum 1/2-inch (13-mm) clearance from jamb stud to allow for installation of control joint in finished assembly.
    c. Extend jamb studs through suspended ceilings and attach to underside of overhead structure.
3. Other Framed Openings: Frame openings other than door openings the same as required for door openings unless otherwise indicated. Install framing below sills of openings to match framing required above door heads.
4. Fire-Resistance-Rated Partitions: Install framing to comply with fire-resistance-rated assembly indicated and support closures and to make partitions continuous from floor to underside of solid structure.
    a. Firestop Track: Where indicated, install to maintain continuity of fire-resistance-rated assembly indicated.
5. Sound-Rated Partitions: Install framing to comply with sound-rated assembly indicated.

E. Direct Furring:
1. Screw to wood framing.
2. Attach to concrete or masonry with stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.

F. Z-Furring Members:
1. Erect insulation, specified in Division 07 Section "Thermal Insulation," vertically and hold in place with Z-furring members spaced 24 inches (610 mm) o.c.

2. Except at exterior corners, securely attach narrow flanges of furring members to wall with concrete stub nails, screws designed for masonry attachment, or powder-driven fasteners spaced 24 inches (610 mm) o.c.
3. At exterior corners, attach wide flange of furring members to wall with short flange extending beyond corner; on adjacent wall surface, screw-attach short flange of furring channel to web of attached channel. At interior corners, space second member no more than 12 inches (305 mm) from corner and cut insulation to fit.

G. Installation Tolerance: Install each framing member so fastening surfaces vary not more than 1/8 inch (3 mm) from the plane formed by faces of adjacent framing.

3.5 INSTALLING SUSPENSION SYSTEMS

A. Install suspension system components according to spacings indicated, but not greater than spacings required by referenced installation standards for assembly types.
1. Hangers: 48 inches (1219 mm) o.c.

B. Isolate suspension systems from building structure where they abut or are penetrated by building structure to prevent transfer of loading imposed by structural movement.

C. Suspend hangers from building structure as follows:
1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structural or suspension system.
   a. Splay hangers only where required to miss obstructions and offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
2. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with locations of hangers required to support standard suspension system members, install supplemental suspension members and hangers in the form of trapezes or equivalent devices.
   a. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced installation standards .
3. Wire Hangers: Secure by looping and wire tying, either directly to structures or to inserts, eye screws, or other devices and fasteners that are secure and appropriate for substrate, and in a manner that will not cause hangers to deteriorate or otherwise fail.
4. Do not attach hangers to steel roof deck.
5. Do not attach hangers to permanent metal forms. Furnish cast-in-place hanger inserts that extend through forms.
6. Do not attach hangers to rolled-in hanger tabs of composite steel floor deck.
7. Do not connect or suspend steel framing from ducts, pipes, or conduit.

D. Fire-Resistance-Rated Assemblies: Wire tie furring channels to supports.

E. Installation Tolerances: Install suspension systems that are level to within [1/8 inch in 12 feet (3 mm in 3.6 m)] measured lengthwise on each member that will receive finishes and transversely between parallel members that will receive finishes.

END OF SECTION 092216

SECTION 092900 - GYPSUM BOARD

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Interior gypsum board.
2. Tile backing panels.

1.2 ACTION SUBMITTALS

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

B. Shop Drawings: Locations and installation of control and expansion joints, including plans, elevations, sections, and attachment details.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Store materials inside under cover and keep them dry and protected against weather, condensation, direct sunlight, construction traffic, and other potential causes of damage. Stack panels flat and supported on risers on a flat platform to prevent sagging.

1.4 FIELD CONDITIONS

A. Environmental Limitations: Comply with ASTM C840 requirements or manufacturer's written instructions, whichever are more stringent.

B. Do not install paper-faced gypsum panels until installation areas are enclosed and conditioned.

C. Do not install panels that are wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or splotchy surface contamination and discoloration.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Resistance-Rated Assemblies: For fire-resistance-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings in accordance with ASTM E119; tested by a qualified testing agency.

B. STC-Rated Assemblies: For STC-rated assemblies, provide materials and construction identical to those tested in assembly indicated on Drawings in accordance with ASTM

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E90 and classified in accordance with ASTM E413; tested by a qualified testing agency.

2.2 GYPSUM BOARD, GENERAL

A. Size: Provide panel products in maximum lengths and widths available that will minimize joints in each area and that correspond with support system specified or indicated on Drawings.

2.3 INTERIOR GYPSUM BOARD

A. Trim for Interior Gypsum Board: ASTM C1047.

1. Material: Galvanized-steel sheet or aluminum-coated steel sheet, rolled zinc, plastic, or paper-faced galvanized-steel sheet .
2. Shapes:

a. Cornerbead.
b. Bullnose bead.
c. LC-Bead: J-shaped; exposed long flange receives joint compound.
d. L-Bead: L-shaped; exposed long flange receives joint compound.
e. U-Bead: J-shaped; exposed short flange does not receive joint compound.
f. Curved-Edge Cornerbead: With notched or flexible flanges.
g. Expansion (Control) Joint: One-piece, rolled zinc with V-shaped slot and removable strip covering slot opening.

B. Joint Treatment Materials for Interior Gypsum Board: Comply with ASTM C475/C475M requirements.

1. Joint Tape: Paper.
2. Joint Compound: For each coat, use formulation that is compatible with other compounds applied on previous or for successive coats.

a. Mold-Resistant Joint Compound: Use mold-resistant formulations with mold-resistant gypsum board products.
b. Prefilling: At open joints , rounded or beveled panel edges, and damaged surface areas, use setting-type taping compound.
c. Embedding and First Coat: For embedding tape and first coat on joints, fasteners, and trim flanges, use setting-type taping compound.
d. Fill Coat: For second coat, use setting-type, sandable topping compound.
e. Finish Coat: For third coat, use setting-type, sandable topping compound.
f. Skim Coat: For final coat of Level 5 finish, use setting-type, sandable topping compound .

2.4 TILE BACKING PANELS

A. Joint Treatment Materials for Tile Backing Panels: Comply with ASTM C475/C475M requirements.

1. Mold-Resistant Joint Compound: Use mold-resistant formulations with mold-resistant panel products.
2. Joint Tape: As recommended in writing by panel manufacturer.

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3. Joint Compound for Tile Backing Panels:

    a. Glass-Mat, Water-Resistant Gypsum Panel: As recommended in writing by panel manufacturer.
    b. Coated Glass-Mat, Water-Resistant Gypsum Backing Panel: As recommended in writing by panel manufacturer.
    c. Water-Resistant Gypsum Backing Board: Use setting-type taping compound and setting-type, sandable topping compound.

2.5 AUXILIARY MATERIALS

A. Provide auxiliary materials that comply with referenced installation standards and manufacturer's written instructions.

B. Laminating Adhesive: Adhesive or joint compound recommended in writing by manufacturer for directly adhering gypsum panels to continuous substrate.

C. Steel Drill Screws: ASTM C1002 unless otherwise specified or indicated on Drawings.

D. Sound-Attenuation Blankets: ASTM C665, Type I (blankets without membrane facing) produced by combining thermosetting resins with mineral fibers as follows:

1. Non-Fire-Resistance-Rated Assemblies: Glass .
2. Fire-Resistance-Rated Assemblies: Comply with mineral-fiber requirements of assembly.

E. Acoustical Sealant: As specified in Section 079219 "Acoustical Joint Sealants."

F. Thermal Insulation: As specified in Section 072100 "Thermal Insulation."

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine areas and substrates including welded hollow-metal frames and support framing, with Installer present, for compliance with requirements and other conditions affecting performance of the Work.

B. Examine panels before installation. Reject panels that are wet, moisture damaged, or mold damaged.

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

3.2 INSTALLATION AND FINISHING OF GYPSUM BOARD, GENERAL

A. Comply with ASTM C840 requirements.

B. Install ceiling panels across framing to minimize the number of abutting end joints and to avoid abutting end joints in central area of each ceiling. Stagger abutting end joints of adjacent panels not less than one framing member.

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C. Install panels with face side out. Butt panels together for a light contact at edges and ends with not more than **1/16 inch** of open space between panels. Do not force into place.

D. Locate edge and end joints over supports, except in ceiling applications where intermediate supports or gypsum board back-blocking is provided behind end joints. Do not place tapered edges against cut edges or ends. Stagger vertical joints on opposite sides of partitions. Do not make joints other than control joints at corners of framed openings.

E. Form expansion (control) joints with space between edges of adjoining gypsum panels.

F. Cover both faces of support framing with gypsum panels in concealed spaces (above ceilings, etc.), except in chases braced internally.

1. Unless concealed application is indicated or required for sound, fire, air, or smoke ratings, coverage may be accomplished with scraps of not less than **8 sq. ft.** in area.
2. Fit gypsum panels around ducts, pipes, and conduits.
3. Where partitions intersect structural members projecting below underside of floor/roof slabs and decks, cut gypsum panels to fit profile formed by structural members; allow **1/4- to 3/8-inch-** wide joints to install sealant.

G. Isolate perimeter of gypsum board applied to non-load-bearing partitions at structural abutments. Provide wide spaces at these locations and trim edges with edge trim where edges of panels are exposed. Seal joints between edges and abutting structural surfaces with acoustical sealant.

H. Attachment to Steel Framing: Attach panels so leading edge or end of each panel is attached to open (unsupported) edges of stud flanges first.

I. Wood Framing: Install gypsum panels over wood framing, with floating internal corner construction. Do not attach gypsum panels across the flat grain of wide-dimension lumber, including floor joists and headers. Float gypsum panels over these members or provide control joints to counteract wood shrinkage.

J. STC-Rated Assemblies: Seal construction at perimeters, behind control joints, and at openings and penetrations with a continuous bead of acoustical sealant. Install acoustical sealant at both faces of partitions at perimeters and through penetrations. Comply with ASTM C919 requirements and with manufacturer's written instructions for locating edge trim and closing off sound-flanking paths around or through assemblies, including sealing partitions above acoustical ceilings.

K. Install sound-attenuation blankets before installing gypsum panels unless blankets are readily installed after panels have been installed on one side.

3.3 INSTALLATION OF INTERIOR GYPSUM BOARD

A. Single-Layer Application:

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1. On ceilings, apply gypsum panels before wall/partition board application to greatest extent possible and at right angles to framing unless otherwise indicated on Drawings.
2. On partitions/walls, apply gypsum panels vertically (parallel to framing) unless otherwise specified or indicated on Drawings or required by fire-resistance-rated assembly, and minimize end joints.

B. Trim for Interior Gypsum Board: For trim with back flanges intended for fasteners, attach to framing with same fasteners used for panels. Otherwise, attach trim in accordance with manufacturer's written instructions.

1. Cornerbead: Install at outside corners [**unless otherwise specified or indicated on Drawings**] .
2. Expansion (Control) Joint: Install control joints in accordance with ASTM C840 and in specific locations approved by Architect for visual effect .

C. Joint Treatment Materials for Interior Gypsum Board: Treat joints, interior angles, edge trim, control joints, penetrations, fastener heads, surface defects, and elsewhere as required to prepare panel surfaces for decoration. Promptly remove residual joint compound from adjacent surfaces.

D. Finish interior gypsum board panels to comply with levels indicated below and in accordance with ASTM C840:
1. Level 4: At panel surfaces that will be exposed to view unless otherwise indicated .
2. Level 5: CEILINGS AND SOFFITS .

3.4 INSTALLATION OF TILE BACKING PANELS

A. Glass-Mat, Water-Resistant Gypsum Panel: Comply with manufacturer's written installation instructions and install at locations indicated to receive tile. Install with **1/4-inch** gap where panels abut other construction or penetrations.

B. Where tile backing panels abut other types of panels in same plane, shim surfaces to produce a uniform plane across panel surfaces.

C. Finish tile backing panels in accordance with manufacturer's written instructions.

3.5 PROTECTION

A. Protect adjacent surfaces from joint compound and promptly remove from floors and other non-gypsum board surfaces. Repair surfaces stained, marred, or otherwise damaged during gypsum board installation and finishing.

B. Protect installed products from damage from weather, condensation, direct sunlight, construction, and other causes during remainder of the construction period.

C. Remove and replace panels that have gotten wet, moisture damaged, or mold damaged.

1. Indications that panels are wet or moisture damaged include, but are not limited to, discoloration, sagging, or irregular shape.
2. Indications that panels are mold damaged include, but are not limited to, fuzzy or

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splotchy surface contamination and discoloration.

END OF SECTION 092900

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SECTION 093000 - TILING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Ceramic and porcelain tile.
2. Waterproof membrane.
3. Crack isolation membrane
4. Tile backing panels.
5. Metal edge strips.

1.2 SUBMITTALS

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

B. Samples:

1. Each type and composition of tile and for each color and finish required.
2. Assembled samples, with grouted joints, for each type and composition of tile and for each color and finish required.

1.3 QUALITY ASSURANCE

A. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of each type of floor tile installation.
2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.4 EXTRA MATERIALS

A. Furnish extra materials that match and are from same production runs as products installed and that are packaged with protective covering and identified with labels describing contents.

1. Tile and Trim Units: 20 Square Feet.

PART 2 - PRODUCTS

2.1 TILE PRODUCTS

A. ANSI Ceramic Tile Standard: Provide Standard grade tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.

B. Tile Type: Glazed wall and paver tile.
   1. Basis of Design: Refer to Finish Schedule on Drawings. Subject to compliance with requirements, provide product indicated on Drawings or a comparable product by one of the following:

      a. American Marazzi Tile, Inc.
      b. American Olean; Division of Dal-Tile International Inc.
      c. Crossville, Inc.
      d. Daltile; Division of Dal-Tile International Inc.
      e. Deutsche Steinzeug America, Inc.
      f. Florida Tile Industries, Inc.
      g. Florim USA.
      h. GranitiFiandre; c/o Trans Ceramica, Ltd.
      i. Interceramic.
      j. Laufen.
      k. Lone Star Ceramics Company.
      l. Grupo Porcelanite.
      m. Portobello America, Inc.
      n. Seneca Tiles, Inc.
      o. United States Ceramic Tile Company.

   2. Composition: Vitreous or impervious natural clay or porcelain.
   3. Tile Color and Pattern: As selected by Architect from manufacturer's full range.
   4. Grout Color: As selected by Architect from manufacturer's full range .

2.2 TILE BACKING PANELS

A. Cementitious Backer Units: ANSI A118.9 or ASTM C 1325.

   1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

      a. C-Cure; C-Cure Board 990.
      b. Custom Building Products; Wonderboard.
      c. FinPan, Inc.; Util-A-Crete Concrete Backer Board.
      d. USG Corporation; DUROCK Cement Board.

   2. Thickness: 5/8 inch (15.9 mm) .

2.3 WATERPROOF MEMBRANE

A. General: Manufacturer's standard product , selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated.

B. Chlorinated-Polyethylene-Sheet: Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.030-inch (0.76-mm) nominal thickness.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Noble Company (The); Nobleseal TS.

C. PVC Sheet: Two layers of PVC sheet heat-fused together and to facings of nonwoven polyester; 0.040-inch (1.01-mm) nominal thickness.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Compotite Corporation; Composeal Gold.

D. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.008-inch (0.203-mm) nominal thickness.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Schluter Systems L.P.; KERDI.

E. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Boiardi Products, a QEP company; Elastiment 644 Membrane Waterproofing System.
b. Bonsal American, an Oldcastle company; B 6000 Waterproof Membrane.
c. Bostik, Inc.; Durabond D-222 Duraguard Membrane .
d. C-Cure; Pro-Red Waterproofing Membrane 63.
e. Custom Building Products; Redgard Waterproofing and Crack Prevention Membrane.
f. Jamo Inc.; Waterproof.
g. Laticrete International, Inc.; Latapoxy 24hr HydroProofing Laticrete Watertight Floor N' Wall Waterproofing.
h. MAPEI Corporation; Mapelastic HPG.
i. Southern Grouts & Mortars, Inc.; Southcrete 1100 Crack Suppression and Waterproofing.
j. TEC, a subsidiary of H. B. Fuller Company; HydraFlex - Waterproofing Crack Isolation Membrane.

F. Latex-Portland Cement: Flexible mortar consisting of cement-based mix and additive.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Boiardi Products, a QEP company; Elastiment 323 Cement Based Waterproofing, Anti-Fracture/Crack Suppression Membrane.
    b. C-Cure; UltraCure 971.
    c. MAPEI Corporation; Mapelastic (PRP 315).
    d. Southern Grouts & Mortars, Inc.; Southcrete 1100.
    e. TEC, a subsidiary of H. B. Fuller Company; Triple Flex Waterproofing, Crack Isolation Membrane & Mortar.

G. Urethane Waterproofing and Tile-Setting Adhesive: One-part, liquid-applied urethane, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Bostik, Inc.; Durabond D-200 Hydroment Ultra-Set Hydroment Ultra-Set Advanced.

2.4 CRACK ISOLATION MEMBRANE

A. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated.

B. Chlorinated-Polyethylene Sheet: Nonplasticized, chlorinated polyethylene faced on both sides with nonwoven polyester fabric; 0.030-inch (0.76-mm) nominal thickness.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Noble Company (The); Nobleseal CIS.

C. PVC Sheet: Two layers of PVC sheet heat-fused together and to facings of nonwoven polyester; 0.040-inch (1.01-mm) nominal thickness.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Compotite Corporation; Composeal Gold.

D. Polyethylene Sheet: Polyethylene faced on both sides with fleece webbing; 0.008-inch (0.203-mm) nominal thickness.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

    a. Schluter Systems L.P.; KERDI.

E. Fabric-Reinforced, Modified-Bituminous Sheet: Self-adhering, modified-bituminous sheet with fabric reinforcement facing; 0.040-inch (1.01-mm) nominal thickness.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. MAPEI Corporation; Mapelastic SM.
b. National Applied Construction Products, Inc.; Strataflex.

F. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Boiardi Products, a QEP company; Elastiment 344 Reinforced Waterproofing and Anti-Fracture/Crack Suppression Membrane.
b. Bonsal American, an Oldcastle company; B 6000 Waterproof Membrane with Glass Fabric.
c. Bostik, Inc.; Hydroment Blacktop 90210.
d. Custom Building Products; 9240 Waterproofing and Anti-Fracture Membrane.
e. Laticrete International, Inc.; Laticrete Blue 92 Anti-Fracture Membrane .
f. MAPEI Corporation; Mapelastic L (PRP M19) .
g. Mer-Kote Products, Inc.; Hydro-Guard 2000.
h. Summitville Tiles, Inc.; S-9000.

G. Latex-Portland Cement: Flexible mortar consisting of cement-based mix and latex additive.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. C-Cure; UltraCure 971.
b. MAPEI Corporation; Mapelastic (PRP 315).
c. TEC, a subsidiary of H. B. Fuller Company; Triple Flex Waterproofing, Crack Isolation Membrane & Mortar.

H. Urethane Crack Isolation Membrane and Tile-Setting Adhesive: One-part, liquid-applied urethane, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Bostik, Inc.; Durabond D-200 Hydroment Ultra-Set Hydroment Ultra-Set Advanced.

2.5 SETTING MATERIALS

A. Dry-Set Portland Cement Mortar (Thin Set): ANSI A118.1.

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. Boiardi Products; a QEP company.
    b. Bonsal American; an Oldcastle company.
    c. Bostik, Inc.
    d. C-Cure.
    e. MAPEI Corporation.

B. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

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. Boiardi Products; a QEP company.
    b. Bonsal American; an Oldcastle company.
    c. Bostik, Inc.
    d. C-Cure.
    e. MAPEI Corporation.

2. Prepackaged, dry-mortar mix to which only water must be added.
3. Prepackaged, dry-mortar mix combined with liquid-latex additive.
4. For wall applications, provide nonsagging mortar.

C. Water-Cleanable, Tile-Setting Epoxy: ANSI A118.3.

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. Atlas Minerals & Chemicals, Inc.
    b. Bonsal American; an Oldcastle company.
    c. Bostik, Inc.
    d. C-Cure.

2.6 GROUT MATERIALS

A. Sand-Portland Cement Grout: ANSI A108.10.

B. Polymer-Modified Tile Grout: ANSI A118.7.

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. Boiardi Products; a QEP company.
    b. Bonsal American; an Oldcastle company.
    c. Bostik, Inc.
    d. C-Cure.

e. Custom Building Products.
f. Jamo Inc.
g. Laticrete International, Inc.
h. MAPEI Corporation.
i. Southern Grouts & Mortars, Inc.
j. Summitville Tiles, Inc.
k. TEC; a subsidiary of H. B. Fuller Company.

2. Polymer Type: Dry, redispersible form, prepackaged with other dry ingredients.
3. Polymer Type: Liquid-latex form for addition to prepackaged dry-grout mix.

C. Water-Cleanable Epoxy Grout: ANSI A118.3.

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. Atlas Minerals & Chemicals, Inc.
b. Boiardi Products; a QEP company.
c. Bonsal American; an Oldcastle company.
d. Bostik, Inc.
e. C-Cure.
f. Custom Building Products.
g. Jamo Inc.
h. Laticrete International, Inc.
i. MAPEI Corporation.
j. Mer-Kote Products, Inc.
k. Southern Grouts & Mortars, Inc.
l. Summitville Tiles, Inc.
m. TEC; a subsidiary of H. B. Fuller Company.

D. Grout for Pregrouted Tile Sheets: Same product used in factory to pregrout tile sheets.

2.7 ELASTOMERIC SEALANTS

A. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Division 07 Section "Joint Sealants."

1. Use sealants that have a VOC content of 250 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

B. One-Part, Mildew-Resistant Silicone Sealant: ASTM C 920; Type S; Grade NS; Class 25; Uses NT, G, A, and, as applicable to nonporous joint substrates indicated, O; formulated with fungicide, intended for sealing interior ceramic tile joints and other nonporous substrates that are subject to in-service exposures of high humidity and extreme temperatures.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. DAP Inc.; 100 percent Silicone Kitchen and Bath Sealant.
b. Dow Corning Corporation; Dow Corning 786.
c. GE Silicones, a division of GE Specialty Materials; Sanitary 1700.
d. Laticrete International, Inc.; Latasil Tile & Stone Sealant.
e. Pecora Corporation; Pecora 898 Sanitary Silicone Sealant.
f. Tremco Incorporated; Tremsil 600 White.

C. Multipart, Pourable Urethane Sealant for Use T: ASTM C 920; Type M; Grade P; Class 25; Uses T, M, A, and, as applicable to joint substrates indicated, O.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Bostik, Inc.; Chem-Calk 550.
b. Degussa Building Systems; Sonneborn Sonolastic SL 2.
c. Pecora Corporation; Dynatrol II-SG NR-200 Urexpan.
d. Sika Corporation; Sikaflex-2c SL.
e. Tremco Incorporated.; THC-900 THC-901 Vulkem 245.

2.8 MISCELLANEOUS MATERIALS

A. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.

B. Metal Edge Strips: Angle or L-shape, nickel silver stainless steel, ASTM A 666, 300 Series exposed-edge material.

C. Grout Sealer: Manufacturer's standard silicone product for sealing grout joints and that does not change color or appearance of grout.

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

a. Bonsal American, an Oldcastle company; Grout Sealer.
b. Bostik, Inc.; CeramaSeal Grout & Tile Sealer .
c. C-Cure; Penetrating Sealer 978.
d. Custom Building Products; Grout and Tile Sealer.
e. Jamo Inc.; Matte Finish Penetrating Sealer.
f. MAPEI Corporation; KER 003, Silicone Spray Sealer for Cementitious Tile Grout .
g. Southern Grouts & Mortars, Inc.; Silicone Grout Sealer.
h. Summitville Tiles, Inc.; SL-15, Invisible Seal Penetrating Grout and Tile Sealer.
i. TEC, a subsidiary of H. B. Fuller Company; TA-256 Penetrating Silicone Grout Sealer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of installed tile.

1. Verify that substrates for setting tile are firm, dry, clean, free of coatings that are incompatible with tile-setting materials including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

3.2 PREPARATION

A. Fill cracks, holes, and depressions in concrete substrates for tile floors installed with thin-set 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, use factory blended tile or blend tiles at Project site before installing.

D. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.

3.3 INSTALLATION

A. Comply with TCA's "Handbook for Ceramic Tile Installation" for TCA 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 TCA 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:

a. Exterior tile floors.
b. Tile floors in wet areas.
c. Tile swimming pool decks.
d. Tile floors in laundries.
e. Tile floors composed of tiles 8 by 8 inches or larger.
f. Tile floors composed of rib-backed tiles.

B. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.

C. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

D. Jointing Pattern: Lay tile in 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.

E. Joint Widths: Unless otherwise indicated, install tile with the following joint widths:
1. Paver Tile: 1/16 inch.
2. Glazed Wall Tile: 1/16 inch.

F. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

G. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

1. Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.
2. Prepare joints and apply sealants to comply with requirements in Division 07 Section "Joint Sealants."

H. Stone Thresholds: Install stone thresholds in same type of setting bed as adjacent floor unless otherwise indicated.

1. At locations where mortar bed (thickset) would otherwise be exposed above adjacent floor finishes, set thresholds in latex-portland cement mortar (thin set).

I. Metal Edge Strips: Install where exposed edge of tile flooring meets carpet, wood, or other flooring that finishes flush with or below top of tile and no threshold is indicated.

J. Grout Sealer: Apply grout sealer to cementitious grout joints in tile floors according to grout-sealer manufacturer's written instructions. As soon as grout sealer has penetrated grout joints, remove excess sealer and sealer from tile faces by wiping with soft cloth.

K. Install cementitious backer units and fiber-cement underlayment and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.

L. Install waterproofing to comply with ANSI A108.13 and manufacturer's written instructions to produce waterproof membrane of uniform thickness and bonded securely to substrate.

M. Install crack isolation membrane to comply with ANSI A108.17 and manufacturer's written instructions to produce membrane of uniform thickness and bonded securely to substrate.

END OF SECTION 093000

SECTION 095123 - ACOUSTICAL TILE CEILINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Acoustical tiles for ceilings.

B. Related Requirements:

C. Products furnished, but not installed under this Section, include anchors, clips, and other ceiling attachment devices to be cast in concrete.

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. Samples: For each exposed product and for each color and texture specified, 6-inches- (150-mm-) in size.

C. Samples for Initial Selection: For components with factory-applied color finishes.

D. Samples for Verification: For each component indicated and for each exposed finish required, prepared on Samples of size indicated below.

1. Acoustical Tile: Set of full-size Samples of each type, color, pattern, and texture.
2. Concealed Suspension-System Members: 6-inch- (150-mm-) long Sample of each type.
3. Exposed Moldings and Trim: Set of 6-inch- (150-mm-) long Samples of each type and color.

1.5 INFORMATIONAL SUBMITTALS

A. Coordination Drawings: Reflected ceiling plans, drawn to scale, on which the following items are shown and coordinated with each other, using input from installers of the items involved:

1. Ceiling suspension-system members.
2. Method of attaching hangers to building structure.
    a. Furnish layouts for cast-in-place anchors, clips, and other ceiling attachment devices whose installation is specified in other Sections.
3. Size and location of initial access modules for acoustical tile.
4. Ceiling-mounted items including lighting fixtures, diffusers, grilles, speakers, sprinklers, access panels, and special moldings.
5. Minimum Drawing Scale: 1/4 inch = 1 foot (1:48).

B. Qualification Data: For testing agency.

C. Product Test Reports: For each acoustical tile ceiling, for tests performed by manufacturer and witnessed by a qualified testing agency.

D. Evaluation Reports: For each acoustical tile ceiling suspension system and anchor and fastener type, from ICC-ES.

E. Field quality-control reports.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For finishes to include in maintenance manuals.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Acoustical Ceiling Units: Full-size tiles equal to 2 percent of quantity installed.
2. Suspension-System Components: Quantity of each concealed grid and exposed component equal to 2 percent of quantity installed.

1.8 QUALITY ASSURANCE

A. Testing Agency Qualifications: Qualified according to the National Voluntary Laboratory Accreditation Program (NVLAP) for testing indicated.

B. Mockups: Build mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Build mockup of typical ceiling area as shown on Drawings.
2. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Deliver acoustical tiles, suspension-system components, and accessories to Project site in original, unopened packages and store them in a fully enclosed, conditioned space where they will be protected against damage from moisture, humidity, temperature extremes, direct sunlight, surface contamination, and other causes.

B. Before installing acoustical tiles, permit them to reach room temperature and a stabilized moisture content.

C. Handle acoustical tiles carefully to avoid chipping edges or damaging units in any way.

1.10 FIELD CONDITIONS

A. Environmental Limitations: Do not install acoustical tile ceilings until spaces are enclosed and weatherproof, wet work in spaces is complete and dry, work above ceilings is complete, and ambient temperature and humidity conditions are maintained at the levels indicated for Project when occupied for its intended use.

1. Pressurized Plenums: Operate ventilation system for not less than 48 hours before beginning acoustical tile ceiling installation.

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 A materials.
2. Smoke-Developed Index: 450 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.

1. Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.

2.2 ACOUSTICAL TILES, GENERAL

A. Source Limitations:

1. Acoustical Ceiling Tile: Obtain each type from single source from single manufacturer.
2. Suspension System: Obtain each type from single source from single manufacturer.

B. Source Limitations: Obtain each type of acoustical ceiling tile and supporting suspension system from single source from single manufacturer.

C. Acoustical Tile Standard: Provide manufacturer's standard tiles of configuration indicated that comply with ASTM E 1264 classifications as designated by types, patterns, acoustical ratings, and light reflectances unless otherwise indicated.

D. Acoustical Tile Colors and Patterns: Match appearance characteristics indicated for each product type.

1. Where appearance characteristics of acoustical tiles are indicated by referencing pattern designations in ASTM E 1264 and not manufacturers' proprietary product designations, provide products selected by Architect from each manufacturer's full range that comply with requirements indicated for type, pattern, color, light reflectance, acoustical performance, edge detail, and size.

2.3 ACOUSTICAL TILES

A. Basis-of-Design Product: Subject to compliance with requirements, provide United States Gypsum Company Eclipse Illusion 2’ x 4’ ¾” FL item no. 78085, NRC 70, CAC min. 35 LR 0.84, color, white (scored to look like two 2 x 2 panels) or a comparable product by one of the following:
1. Armstrong World Industries, Inc.
2. CertainTeed

2.4 METAL SUSPENSION SYSTEMS, GENERAL

A. Metal Suspension-System Standard: Provide manufacturer's standard metal suspension systems of types, structural classifications, and finishes indicated that comply with applicable requirements in ASTM C 635/C 635M.

B. Attachment Devices: Size for five times the design load indicated in ASTM C 635/C 635M, Table 1, "Direct Hung," unless otherwise indicated. Comply with seismic design requirements.

C. Wire Hangers, Braces, and Ties: Provide wires complying with the following requirements:

1. Zinc-Coated, Carbon-Steel Wire: ASTM A 641/A 641M, Class 1 zinc coating, soft temper.

2. Size: Select wire diameter so its stress at three times hanger design load (ASTM C 635/C 635M, Table 1, "Direct Hung") will be less than yield stress of wire, but provide not less than 0.106-inch- (2.69-mm-) diameter wire.

D. Hanger Rods: Mild steel, zinc coated or protected with rust-inhibitive paint.

E. Angle Hangers: Angles with legs not less than 7/8 inch (22 mm) wide; formed with 0.04-inch- (1-mm-) thick, galvanized-steel sheet complying with ASTM A 653/A 653M, G90 (Z275) coating designation; with bolted connections and 5/16-inch- (8-mm-) diameter bolts.

2.5 METAL SUSPENSION SYSTEM for ACT-1

A. Basis-of-Design Product: Subject to compliance with requirements, provide United States Gypsum Company; Centricitee DXT for a 2 x 4 suspension system or a comparable product by one of the following:
1. Armstrong World Industries, Inc.
2. CertainTeed

B. Direct-Hung, Double-Web Suspension System: Main and cross runners roll formed from and capped with cold-rolled steel sheet, prepainted, electrolytically zinc coated, or hot-dip galvanized according to ASTM A 653/A 653M, G30 (Z90) coating designation.

1. Structural Classification: Intermediate-duty system.
2. Access: Upward and, with initial access openings of size indicated below and located throughout ceiling within each module formed by main and cross runners, with additional access available by progressively removing remaining acoustical tiles.

a. Initial Access Opening: In each module, 24 by 48 inches (610 by 1,220 mm).

2.6 MISCELLANEOUS MATERIALS

A. Staples: 5/16-inch- (8-mm-) long, divergent-point staples.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, including structural framing and substrates to which acoustical tile ceilings attach or abut, with Installer present, for compliance with requirements specified in this and other Sections that affect ceiling installation and anchorage and for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

B. Examine acoustical tiles before installation. Reject acoustical tiles that are wet, moisture damaged, or mold damaged.

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

3.2 PREPARATION

A. Testing Substrates: Before installing adhesively applied tiles on wet-placed substrates such as cast-in-place concrete or plaster, test and verify that moisture level is below tile manufacturer's recommended limits.

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.

3.3 INSTALLATION OF SUSPENDED ACOUSTICAL TILE CEILINGS

A. General: Install acoustical panel ceilings to comply with ASTM C 636/C 636M and seismic design requirements indicated, according to manufacturer's written instructions and CISCA's "Ceiling Systems Handbook."

B. Suspend ceiling hangers from building's structural members and as follows:

1. Install hangers plumb and free from contact with insulation or other objects within ceiling plenum that are not part of supporting structure or of ceiling suspension system.
2. Splay hangers only where required to miss obstructions; offset resulting horizontal forces by bracing, countersplaying, or other equally effective means.
3. Where width of ducts and other construction within ceiling plenum produces hanger spacings that interfere with location of hangers at spacings required to support standard suspension-system members, install supplemental suspension members and hangers in form of trapezes or equivalent devices.
4. Secure wire hangers to ceiling suspension members and to supports above with a minimum of three tight turns. Connect hangers directly either to structures or to inserts, eye screws, or other devices that are secure and appropriate for substrate and that will not deteriorate or otherwise fail due to age, corrosion, or elevated temperatures.
5. Secure flat, angle, channel, and rod hangers to structure, including intermediate framing members, by attaching to inserts, eye screws, or other devices that are secure and appropriate for both the structure to which hangers are attached and the type of hanger involved. Install hangers in a manner that will not cause them to deteriorate or fail due to age, corrosion, or elevated temperatures.
6. Do not support ceilings directly through resilient channels in drywall ceiling assembly.
7. Attach hangers to structural members.
8. Space hangers not more than 48 inches (1200 mm) o.c. along each member supported directly from hangers unless otherwise indicated; provide hangers not more than 8 inches (200 mm) from ends of each member.
9. Size supplemental suspension members and hangers to support ceiling loads within performance limits established by referenced standards and publications.

C. Secure bracing wires to ceiling suspension members and to supports with a minimum of four tight turns. Suspend bracing from building's structural members as required for hangers without attaching to permanent metal forms, steel deck, or steel deck tabs. Fasten bracing wires into concrete with cast-in-place or postinstalled anchors.

D. Install edge moldings and trim of type indicated at perimeter of acoustical tile ceiling area and where necessary to conceal edges of acoustical tiles.
   1. Screw attach moldings to substrate at intervals not more than 16 inches (400 mm) o.c. and not more than 3 inches (75 mm) from ends, leveling with ceiling suspension system to a tolerance of 1/8 inch in 12 feet (3.2 mm in 3.6 m). Miter corners accurately and connect securely.
   2. Do not use exposed fasteners, including pop rivets, on moldings and trim.

E. Install suspension-system runners so they are square and securely interlocked with one another. Remove and replace dented, bent, or kinked members.

F. Arrange directionally patterned acoustical tiles as follows:

   1. As indicated on reflected ceiling plans.
   2. Install tiles with pattern running in one direction parallel to short axis of space.
   3. Install tiles in a basket-weave pattern.

G. Install acoustical tiles in coordination with suspension system and exposed moldings and trim. Place splines or suspension-system flanges into kerfed edges so tile-to-tile joints are closed by double lap of material.

   1. Fit adjoining tile to form flush, tight joints. Scribe and cut tile for accurate fit at borders and around penetrations through tile.
   2. Hold tile field in compression by inserting leaf-type, spring-steel spacers between tile and moldings, spaced 12 inches (305 mm) o.c.
   3. Protect lighting fixtures and air ducts to comply with requirements indicated for fire-resistance-rated assembly.

   4. As indicated on reflected ceiling plans.

3.4 CLEANING

A. Clean exposed surfaces of acoustical tile ceilings, including trim and edge moldings. Comply with manufacturer's written instructions for cleaning and touchup of minor finish damage. Remove and replace tiles and other ceiling components that cannot be successfully cleaned and repaired to permanently eliminate evidence of damage.

END OF SECTION 095123

SECTION 096513 - RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Resilient base.
2. Resilient stair accessories.
3. Resilient molding accessories.

B. Related Sections:
1. Division 09 Section "Resilient Tile Flooring" for resilient floor tile.

1.3 SUBMITTALS

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

B. Samples for Initial Selection: For each type of product indicated.

1.4 QUALITY ASSURANCE

A. Fire-Test-Response Characteristics: As determined by testing identical products according to ASTM E 648 or NFPA 253 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Store resilient products and installation materials in dry spaces protected from the weather, with ambient temperatures maintained within range recommended by manufacturer, but not less than 50 deg F or more than 90 deg F.

1.6 PROJECT CONDITIONS

A. Maintain ambient temperatures within range recommended by manufacturer, but not less than 70 deg F or more than 95 deg F , in spaces to receive resilient products during the following time periods:

1. 48 hours before installation.
2. During installation.
3. 48 hours after installation.

B. Until Substantial Completion, maintain ambient temperatures within range recommended by manufacturer, but not less than 55 deg F or more than 95 deg F .

C. Install resilient products after other finishing operations, including painting, have been completed.

1.7 EXTRA MATERIALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Furnish not less than 10 linear feet for every 500 linear feet or fraction thereof, of each type, color, pattern, and size of resilient product installed.

PART 2 - PRODUCTS

2.1 RESILIENT BASE

A. Resilient Base:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Armstrong World Industries, Inc.
   b. Johnsonite.
   c. Roppe Corporation, USA.

B. Resilient Base Standard: ASTM F 1861.

1. Material Requirement: Type TV (vinyl, thermoplastic).
2. Manufacturing Method: Group I (solid, homogeneous).
3. Style: Cove (base with toe) at tile floors; Straight (flat or toeless) at carpet floors.

C. Minimum Thickness: 0.125 inch .

D. Height: 4 inches or 6 inches s indicated on Drawings.

E. Lengths: Coils in manufacturer's standard length .

F. Outside Corners: Preformed .

G. Inside Corners: Preformed .

H. Finish: As selected by Architect from manufacturer's full range.

I. Colors and Patterns: As selected by Architect from full range of industry colors.

2.2 RESILIENT STAIR ACCESSORIES

A. Resilient Stair Treads:

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. Burke Mercer Flooring Products; Division of Burke Industries, Inc.
    b. Endura Rubber Flooring; Division of Burke Industries, Inc.
    c. Estrie Products International; American Biltrite (Canada) Ltd.
    d. Flexco, Inc.
    e. Johnsonite.
    f. Mondo Rubber International, Inc.
    g. Musson, R. C. Rubber Co.
    h. Nora Rubber Flooring; Freudenberg Building Systems, Inc.
    i. PRF USA, Inc.
    j. R.C.A. Rubber Company (The).
    k. Roppe Corporation, USA.
    l. VPI, LLC; Floor Products Division.
    m. .

B. Resilient Stair Treads Standard: ASTM F 2169.

1. Material Requirement:: Type TV (vinyl, thermoplastic).
2. Surface Design:

    a. Class 2, Pattern: Raised-rib design.

C. Nosing Style:: Round.

D. Nosing Height: Field verify

E. Thickness: 1/4 inch (6 mm) and tapered to back edge.

F. Size: Lengths and depths to fit each stair tread in one piece.

G. Risers: Smooth, flat, toeless, height and length to cover risers; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

1. Thickness: 0.125 inch (3.2 mm).

H. Stringers: Of same thickness as risers, height and length after cutting to fit risers and treads and to cover stair stringers; produced by same manufacturer as treads and recommended by manufacturer for installation with treads.

I. Colors and Patterns:: As selected by Architect from full range of industry colors.

2.3 RESILIENT MOLDING ACCESSORY

A. Resilient Molding Accessory:

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
   a. Johnsonite.
   b. Roppe Corporation, USA.
   c. VPI, LLC; Floor Products Division.

B. Description: Cap for cove resilient floor covering Nosing for resilient floor covering Reducer strip for resilient floor covering Transition strips.

C. Material: Vinyl.

D. Profile and Dimensions: As required between different floor materials and finish floors with different heights **.**

E. Colors and Patterns: As selected by Architect from full range of industry colors.

2.4 INSTALLATION MATERIALS

A. Trowelable Leveling and Patching Compounds: Latex-modified, portland cement based or blended hydraulic-cement-based formulation provided or approved by manufacturer for applications indicated.

B. Adhesives: Water-resistant type recommended by manufacturer to suit resilient products and substrate conditions indicated.

1. Use adhesives that comply with the following limits for VOC content when calculated according to 40 CFR 59, Subpart D (EPA Method 24):

   a. Cove Base Adhesives: Not more than 50 g/L.
   b. Rubber Floor Adhesives: Not more than 60 g/L.

C. Stair-Tread-Nose Filler: Two-part epoxy compound recommended by resilient tread manufacturer to fill nosing substrates that do not conform to tread contours.

D. Floor Polish: Provide protective liquid floor polish products as recommended by resilient stair tread manufacturer.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient products.

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

3.2 PREPARATION

A. Prepare substrates according to manufacturer's written instructions to ensure adhesion of resilient products.

B. Concrete Substrates for Resilient Stair Treads and Accessories: Prepare according to ASTM F 710.

1. Verify that substrates are dry and free of curing compounds, sealers, and hardeners.
2. Remove substrate coatings and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, using mechanical methods recommended by manufacturer. Do not use solvents.
3. Alkalinity and Adhesion Testing: Perform tests recommended by manufacturer.
4. Moisture Testing: Perform tests recommended by manufacturerProceed with installation only after substrates pass testing.

C. Fill cracks, holes, and depressions in substrates with trowelable leveling and patching compound and remove bumps and ridges to produce a uniform and smooth substrate.

D. Do not install resilient products until they are same temperature as the space where they are to be installed.

1. Move resilient products and installation materials into spaces where they will be installed at least 48 hours in advance of installation.

E. Sweep and vacuum clean substrates to be covered by resilient products immediately before installation.

3.3 RESILIENT BASE INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient base.

B. Apply resilient base to walls, columns, pilasters, casework and cabinets in toe spaces, and other permanent fixtures in rooms and areas where base is required.

C. Install resilient base in lengths as long as practicable without gaps at seams and with tops of adjacent pieces aligned.

D. Tightly adhere resilient base to substrate throughout length of each piece, with base in continuous contact with horizontal and vertical substrates.

E. Do not stretch resilient base during installation.

F. On masonry surfaces or other similar irregular substrates, fill voids along top edge of resilient base with manufacturer's recommended adhesive filler material.

G. Preformed Corners: Install preformed corners before installing straight pieces.

3.4 RESILIENT ACCESSORY INSTALLATION

A. Comply with manufacturer's written instructions for installing resilient accessories.

B. Resilient Stair Accessories:

1. Use stair-tread-nose filler to fill nosing substrates that do not conform to tread contours.
2. Tightly adhere to substrates throughout length of each piece.
3. For treads installed as separate, equal-length units, install to produce a flush joint between units.

C. Resilient Molding Accessories: Butt to adjacent materials and tightly adhere to substrates throughout length of each piece. Install reducer strips at edges of carpet and/or resilient floor covering that would otherwise be exposed.

3.5 CLEANING AND PROTECTION

A. Comply with manufacturer's written instructions for cleaning and protection of resilient products.

B. Perform the following operations immediately after completing resilient product installation:

1. Remove adhesive and other blemishes from exposed surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

C. Protect resilient products from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

D. Cover resilient products until Substantial Completion.

END OF SECTION 096513

SECTION 096516 - RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Unbacked vinyl sheet flooring.

B. Related Requirements:

1. Section 024119 "Selective Demolition" for removing existing floor coverings.
2. Section 096513 "Resilient Base and Accessories" for wall base and accessories installed with resilient sheet flooring.
3. Section 096519 "Resilient Tile and Plank Flooring" for modular resilient flooring.
4. Section 096543 "Linoleum Flooring" for modular and sheet linoleum flooring.

1.2 ACTION SUBMITTALS

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

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation instructions for each type of substrate.

B. Shop Drawings: For each type of resilient flooring type required.

1. Include flooring layouts, locations of seams, edges, columns, doorways, enclosing partitions, built-in furniture, cabinets, and cutouts.
2. Show details of special patterns.

C. Samples for Initial Selection: For each type of resilient flooring product required.

D. Samples for Verification: For each type of resilient flooring product, in manufacturer's standard size, but not less than 6-by-9-inch sections of each color, texture, and pattern required.

1. Heat-Welding Bead: Include manufacturer's standard-size Samples, but not less than 9 inches long, of each color required.

E. Welded-Seam Samples: For seamless-installation technique indicated and for each resilient flooring product, color, and pattern required; with seam running lengthwise and in center of 6-by-9-inch Sample applied to a rigid backing and prepared by Installer for this Project.

F. Product Schedule: For each type of resilient flooring product required. Use same

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designations indicated on Drawings.

1.3 CLOSEOUT SUBMITTALS

A. Maintenance Data: For each type of resilient sheet flooring to include the following:

1. Methods for maintaining resilient sheet flooring, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to resilient sheet flooring.

1.4 MAINTENANCE MATERIAL SUBMITTALS

A. Extra Stock Material: Furnish extra materials [**, from the same production run,**] to Owner that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Resilient Sheet Flooring: Full-width rolls equal to [**5**]<**Insert number**> percent of amount installed for each type, color, and pattern indicated, but not less than **10 sq. yd.**.

1.5 WARRANTY

A. Special Warranty for Resilient Flooring Products: Manufacturer agrees to repair or replace components of flooring installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of flooring due to unusual traffic, failure of substrate, vandalism, or abuse.

B. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS

A. Fire-Test-Response Characteristics: For resilient sheet flooring, as determined by testing identical products in accordance with ASTM E648 or ASTM E662 by a qualified testing agency.

1. Critical Radiant Flux Classification: Class I, not less than 0.45 W/sq. cm.

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2.2 RESILIENT SHEET FLOORING

A. Unbacked Vinyl Sheet Flooring (Per Drawings): Resilient sheet flooring product with wear layer that is printed or decorated, composed of fillers, pigments, and vinyl binders.

1. Classification: ASTM F1913.
2. Thickness: 0.080 inch.

3. Surface Protection Layer: Clear specialty performance top layer.
4. Sheet Width: Manufacturer's standard.
5. Seamless Installation Method: Heat welded.
6. Colors and Patterns: As indicated by manufacturer's designations.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, with Installer present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

1. Verify that finishes of substrates comply with tolerances and other requirements specified in other Sections and that substrates are free of cracks, ridges, depressions, scale, and foreign deposits that might interfere with adhesion of resilient sheet flooring.

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

1. Installation of resilient flooring products indicates acceptance of surfaces and conditions.

3.2 PREPARATION

A. Prepare substrates in accordance with resilient sheet flooring manufacturer's written instructions to ensure adhesion of resilient sheet flooring.

B. Concrete Substrates: Prepare in accordance with ASTM F710.

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 resilient sheet flooring manufacturer. Do not use solvents.

3. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft., and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

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a. Anhydrous Calcium Chloride Test: ASTM F1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. in 24 hours.
b. Relative Humidity Test: Using in-situ probes, ASTM F2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.

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 resilient sheet flooring until materials are the same temperature as space where they are to be installed.

1. At least 48 hours in advance of installation, move flooring and installation materials into spaces where they will be installed.

E. Immediately before installation, sweep and vacuum clean substrates to be covered by resilient sheet flooring.

3.3 INSTALLATION OF RESILIENT SHEET FLOORING

A. Comply with manufacturer's written installation instructions.

B. Unroll resilient sheet flooring and allow it to stabilize before cutting and fitting.

C. Lay out resilient sheet flooring as follows:

1. Maintain uniformity of flooring direction.
2. Minimize number of seams; place seams in inconspicuous and low-traffic areas, at least **6 inches** away from parallel joints in flooring substrates.
3. Match edges of flooring for color shading at seams.
4. Avoid cross seams.

D. Scribe and cut resilient sheet flooring to butt neatly and tightly to vertical surfaces and permanent fixtures, including built-in furniture, cabinets, pipes, outlets, and door frames.

E. Extend resilient sheet flooring into toe spaces, door reveals, closets, and similar openings.

F. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on resilient sheet flooring as marked on substrates. Use chalk or other nonpermanent marking device.

G. Install resilient sheet flooring on covers for telephone and electrical ducts and similar items in installation areas. Maintain overall continuity of color and pattern between pieces of flooring installed on covers and adjoining flooring. Tightly adhere flooring edges to substrates that abut covers and to cover perimeters.

H. Adhere resilient sheet flooring to substrates using a full spread of adhesive applied to

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substrate to produce a completed installation without open cracks, voids, raising and puckering at joints, telegraphing of adhesive spreader marks, and other surface imperfections.

I. Seamless Installation:

1. Heat-Welded Seams: Comply with ASTM F1516. Rout joints and heat weld with welding bead to fuse sections permanently into a seamless flooring installation. Prepare, weld, and finish seams to produce surfaces flush with adjoining flooring surfaces.
2. Chemically Bonded Seams: Bond seams with chemical-bonding compound to fuse sections permanently into a seamless flooring installation. Prepare seams and apply compound to produce tightly fitted seams without gaps, overlays, or excess bonding compound on flooring surfaces.

J. Integral-Flash Cove Base: Cove resilient sheet flooring 6 inches to dimension indicated on Drawings up vertical surfaces. Support flooring at horizontal and vertical junction with cove strip. Butt at top against cap strip.

1. Install metal corners at inside and outside corners.

3.4 CLEANING

A. Comply with manufacturer's written instructions for cleaning resilient sheet flooring.

B. Perform the following operations immediately after completing resilient sheet flooring installation:

1. Remove adhesive and other blemishes from surfaces.
2. Sweep and vacuum surfaces thoroughly.
3. Damp-mop surfaces to remove marks and soil.

3.5 PROTECTION

A. Comply with manufacturer's written instructions for protecting resilient sheet flooring.

B. Protect resilient sheet flooring from mars, marks, indentations, and other damage from construction operations and placement of equipment and fixtures during remainder of construction period.

C. Cover resilient sheet flooring until Substantial Completion.

END OF SECTION 096516

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SECTION 096813 - TILE CARPETING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes modular carpet tile.

B. Related Requirements:
1. Section 096513 "Resilient Base and Accessories" for resilient wall base and accessories installed with carpet tile.
2. Section 096816 "Sheet Carpeting" for carpet roll goods.

1.3 PREINSTALLATION MEETINGS

A. Preinstallation Conference: Conduct conference at Project site.

1. Review methods and procedures related to carpet tile installation including, but not limited to, the following:

a. Review delivery, storage, and handling procedures.
b. Review ambient conditions and ventilation procedures.
c. Review subfloor preparation procedures.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product.

1. Include manufacturer's written data on physical characteristics, durability, and fade resistance.
2. Include manufacturer's written installation recommendations for each type of substrate.

B. Sustainable Design Submittals.
1. Refer to Section 01 8113 for sustainable design submittal requirements adhesives, indicating VOC content.
2. Laboratory Test Reports: For adhesives, indicating compliance with requirements for low-emitting materials.

3. Refer to Section 01 8113 for sustainable design submittal requirements regarding laboratory test reports: For flooring products, indicating compliance with requirements for low-emitting materials.

C. Shop Drawings: For carpet tile installation, plans showing the following:

1. Columns, doorways, enclosing walls or partitions, built-in cabinets, and locations where cutouts are required in carpet tiles.
2. Carpet tile type, color, and dye lot.
3. Type of subfloor.
4. Type of installation.
5. Pattern of installation.
6. Pattern type, location, and direction.
7. Pile direction.
8. Type, color, and location of insets and borders.
9. Type, color, and location of edge, transition, and other accessory strips.
10. Transition details to other flooring materials.

D. Samples: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

E. Samples for Initial Selection: For each type of carpet tile.

1. Include Samples of exposed edge, transition, and other accessory stripping involving color or finish selection.

F. Samples for Verification: For each of the following products and for each color and texture required. Label each Sample with manufacturer's name, material description, color, pattern, and designation indicated on Drawings and in schedules.

1. Carpet Tile: Full-size Sample.
2. Exposed Edge, Transition, and Other Accessory Stripping: 12-inch- (300-mm-) long Samples.

G. Product Schedule: For carpet tile. Use same designations indicated on Drawings.

H. Sustainable Product Certification: Provide ANSI/NSF 140 certification for carpet products.

1.5 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer.

B. Product Test Reports: For carpet tile, for tests performed by a qualified testing agency.

C. Sample Warranty: For special warranty.

1.6 CLOSEOUT SUBMITTALS

A. Maintenance Data: For carpet tiles to include in maintenance manuals. Include the following:

1. Methods for maintaining carpet tile, including cleaning and stain-removal products and procedures and manufacturer's recommended maintenance schedule.
2. Precautions for cleaning materials and methods that could be detrimental to carpet tile.

1.7 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials, from the same product run, that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Carpet Tile: Full-size units equal to 5 percent of amount installed for each type indicated, but not less than 10 sq. yd. (8.3 sq. m).

1.8 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer who is certified by the International Certified Floorcovering Installers Association at the Commercial II certification level.

1.9 DELIVERY, STORAGE, AND HANDLING

A. Comply with CRI's "CRI Carpet Installation Standard."

1.10 FIELD CONDITIONS

A. Comply with CRI's "CRI Carpet Installation Standard" for temperature, humidity, and ventilation limitations.

B. Environmental Limitations: Do not deliver or install carpet tiles until spaces are enclosed and weathertight, wet-work in spaces is complete and dry, and ambient temperature and humidity conditions are maintained at levels planned for building occupants during the remainder of the construction period.

C. Do not install carpet tiles over concrete slabs until slabs have cured and are sufficiently dry to bond with adhesive and concrete slabs have pH range recommended by carpet tile manufacturer.

D. Where demountable partitions or other items are indicated for installation on top of carpet tiles, install carpet tiles before installing these items.

1.11 WARRANTY

A. Special Warranty for Carpet Tiles: Manufacturer agrees to repair or replace components of carpet tile installation that fail in materials or workmanship within specified warranty period.

1. Warranty does not include deterioration or failure of carpet tile due to unusual traffic, failure of substrate, vandalism, or abuse.
2. Failures include, but are not limited to, the following:

a. More than 10 percent edge raveling, snags, and runs.
b. Dimensional instability.
c. Excess static discharge.
d. Loss of tuft-bind strength.
e. Loss of face fiber.
f. Delamination.

3. Warranty Period: 10 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 CARPET TILE

A. Basis-of-Design Product: Refer to Finish Schedule. Products by other manufacturers that meet the specified performance requirements are also acceptable.

B. Primary Backing/Backcoating: Manufacturer's standard composite materials.

C. Secondary Backing: Manufacturer's standard material.

D. Backing System: Manufacturer’s standard material.

E. Applied Treatments:

1. Soil-Resistance Treatment: Manufacturer's standard treatment.

2. Sustainable Product Certification: Gold level certification according to ANSI/NSF 140.
3. Flooring products shall comply with the 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."

F. Performance Characteristics:

1. Traffic Class: Heavy traffic (TARR).
2. Antimicrobial Assessment: Passes (AATCC-174)
3. Radiant Panel: Class 1
4. Methanamine Pill Test: Passes (DOCFF-1-70)

5. Dry Breaking Strength: Not less than 100 lbf (445 N) according to ASTM D 2646.
6. ADA Compliance: Comply with Americans for Disabilities Act minimum static coefficient of friction of 0.6 for accessible routes.

2.2 INSTALLATION ACCESSORIES

A. Trowelable Leveling and Patching Compounds: Latex-modified, hydraulic-cement-based formulation provided or recommended by carpet tile manufacturer.

B. Adhesives: Water-resistant, mildew-resistant, nonstaining, pressure-sensitive type to suit products and subfloor conditions indicated, that comply with flammability requirements for installed carpet tile, and are recommended by carpet tile manufacturer for releasable installation.

1. Refer to Section 01 8113 for sustainable design submittal requirements for content.

C. Metal Edge/Transition Strips: Extruded aluminum with mill finish of profile and width shown, of height required to protect exposed edge of carpet, and of maximum lengths to minimize running joints.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for maximum moisture content, alkalinity range, installation tolerances, and other conditions affecting carpet tile performance.

B. Examine carpet tile for type, color, pattern, and potential defects.

C. Concrete Slabs: Verify that finishes comply with requirements specified in Section 033000 "Cast-in-Place Concrete" and that surfaces are free of cracks, ridges, depressions, scale, and foreign deposits.

1. Moisture Testing: Perform tests so that each test area does not exceed 200 sq. ft. (18.6 sq. m), and perform no fewer than three tests in each installation area and with test areas evenly spaced in installation areas.

a. Anhydrous Calcium Chloride Test: ASTM F 1869. Proceed with installation only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
b. Relative Humidity Test: Using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
c. Perform additional moisture tests recommended in writing by adhesive and carpet tile manufacturers. Proceed with installation only after substrates pass testing.

D. Wood Subfloors: Verify the following:

1. Underlayment over subfloor complies with requirements specified in Section 061600 "Sheathing."
2. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

E. Metal Subfloors: Verify the following:

1. Underlayment surface is free of irregularities and substances that may interfere with adhesive bond or show through surface.

F. Painted Subfloors: Perform bond test recommended in writing by adhesive manufacturer.

1. Access Flooring Systems: Verify the following:
2. Access floor substrate is compatible with carpet tile and adhesive if any.
3. Underlayment surface is flat, smooth, evenly planed, tightly jointed, and free of irregularities, gaps greater than 1/8 inch (3 mm), protrusions more than 1/32 inch (0.8 mm), and substances that may interfere with adhesive bond or show through surface.

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

3.2 PREPARATION

A. General: Comply with CRI's "Carpet Installation Standards" and with carpet tile manufacturer's written installation instructions for preparing substrates indicated to receive carpet tile.

B. Use trowelable leveling and patching compounds, according to manufacturer's written instructions, to fill cracks, holes, depressions, and protrusions in substrates. Fill or level cracks, holes and depressions 1/8 inch (3 mm) wide or wider, and protrusions more than 1/32 inch (0.8 mm) unless more stringent requirements are required by manufacturer's written instructions.

C. Concrete Substrates: Remove coatings, including curing compounds, and other substances that are incompatible with adhesives and that contain soap, wax, oil, or silicone, without using solvents. Use mechanical methods recommended in writing by adhesive and carpet tile manufacturers.

D. Metal Substrates: Clean grease, oil, soil and rust, and prime if recommended in writing by adhesive manufacturer. Rough sand painted metal surfaces and remove loose paint. Sand aluminum surfaces, to remove metal oxides, immediately before applying adhesive.

E. Broom and vacuum clean substrates to be covered immediately before installing carpet tile.

3.3 INSTALLATION

A. General: Comply with CRI's "CRI Carpet Installation Standard," Section 18, "Modular Carpet" and with carpet tile manufacturer's written installation instructions.

B. Installation Method: As recommended in writing by carpet tile manufacturer.

C. Maintain dye-lot integrity. Do not mix dye lots in same area.

D. Maintain pile-direction patterns recommended in writing by carpet tile manufacturer.

E. Cut and fit carpet tile to butt tightly to vertical surfaces, permanent fixtures, and built-in furniture including cabinets, pipes, outlets, edgings, thresholds, and nosings. Bind or seal cut edges as recommended by carpet tile manufacturer.

F. Extend carpet tile into toe spaces, door reveals, closets, open-bottomed obstructions, removable flanges, alcoves, and similar openings.

G. Maintain reference markers, holes, and openings that are in place or marked for future cutting by repeating on carpet tile as marked on subfloor. Use nonpermanent, nonstaining marking device.

H. Install pattern parallel to walls and borders.

I. Access Flooring: Stagger joints of carpet tiles so carpet tile grid is offset from access flooring panel grid. Do not fill seams of access flooring panels with carpet adhesive; keep seams free of adhesive.

3.4 CLEANING AND PROTECTION

A. Perform the following operations immediately after installing carpet tile:

1. Remove excess adhesive and other surface blemishes using cleaner recommended by carpet tile manufacturer.
2. Remove yarns that protrude from carpet tile surface.
3. Vacuum carpet tile using commercial machine with face-beater element.

B. Protect installed carpet tile to comply with CRI's "Carpet Installation Standard," Section 20, "Protecting Indoor Installations."

C. Protect carpet tile against damage from construction operations and placement of equipment and fixtures during the remainder of construction period. Use protection methods indicated or recommended in writing by carpet tile manufacturer.

END OF SECTION 096813

SECTION 099113 - EXTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following exterior substrates:

1. Concrete.
2. Fiber-cement board.
3. Concrete masonry units (CMUs).
4. Steel and iron (not including stairs, guard railings and railings).
5. Galvanized metal.
6. Wood.

B. Related Requirements:

1. Section 051200 "Structural Steel Framing" for shop priming of metal substrates.
2. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
3.
4. Section 099200 “Pavement ,Markings” for pavement marking at interior and exterior pavement.

1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

E. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Sustainable Design Submittals:

1. Refer to Section 01 8113 for sustainable design submittal requirements for VOC content of paints.

C. Samples for Initial Selection: For each type of topcoat product.

D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 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.

1.6 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.

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.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints in snow, rain, fog, or mist; when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Benjamin Moore & Co.
2. Sherwin-Williams Company (The).
3. Valspar Corporation

B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Exterior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. Colors: As selected by Architect from manufacturer's full range.

2.3 METAL PRIMERS

A. Primer, Galvanized: As recommend in writing by topcoat manufacturer.

2.4 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:
1. Fiber-Cement 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 Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:

1. SSPC-SP 2.
2. SSPC-SP 3.
3. SSPC-SP 7/NACE No. 4.
4. SSPC-SP 11.

E. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

F. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable items same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed items with prime coat only.

3. Paint both sides and edges of exterior doors and entire exposed surface of exterior door frames.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint undercoats same color as topcoat, but tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 EXTERIOR PAINTING SCHEDULE

As indicated on Drawings.

A. Cement Board Substrates:

1. Latex System MPI EXT 3.3A:

a. Prime Coat: Latex, exterior, matching topcoat.
b. Prime Coat: Primer, alkali resistant, water based, MPI #3.

1) Sherwin Williams Concrete and Masonry Primer A24W8300.

c. Intermediate Coat: Latex, exterior, matching topcoat.

d. Topcoat: Latex, exterior, semi-gloss (MPI Gloss Level 5), MPI #11.

1) Sherwin Williams Emerald Acrylic Latex Gloss A08W00151.

END OF SECTION 099113

SECTION 099123 - INTERIOR PAINTING

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of paint systems on the following interior substrates:

1. Concrete.
2. Concrete masonry units (CMUs).
3. Steel and iron. (not including stairs, railings and guard railings).
4. Galvanized metal.
5. Wood.
6. Gypsum board.

B. Related Requirements:

1. Section 051200 "Structural Steel Framing" for shop priming structural steel.
2. Section 055000 "Metal Fabrications" for shop priming metal fabrications.
3.
4. Section 099200 “Pavement ,Markings” for pavement marking at interior and exterior pavement.
5. Section 099300 "Staining and Transparent Finishing" for surface preparation and the application of wood stains and transparent finishes on interior wood substrates.
6. Section 099600 “High Performance Coatings” for coatings at interior stairs, guard railings and railings.

1.3 DEFINITIONS

A. MPI Gloss Level 1: Not more than five units at 60 degrees and 10 units at 85 degrees, according to ASTM D 523.

B. MPI Gloss Level 2: Not more than 10 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

C. MPI Gloss Level 3: 10 to 25 units at 60 degrees and 10 to 35 units at 85 degrees, according to ASTM D 523.

D. MPI Gloss Level 4: 20 to 35 units at 60 degrees and not less than 35 units at 85 degrees, according to ASTM D 523.

E. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

F. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

G. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include Printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.
2. Indicate VOC content.

B. Sustainable Design Submittals:

1. Refer to Section 01 8113 for sustainable design submittal requirements for paints and coatings.

C. Samples for Initial Selection: For each type of topcoat product.

D. Product List: Cross-reference to paint system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 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.

1.6 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.

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.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.
4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply paints only when temperature of surfaces to be painted and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply paints when relative humidity exceeds 85 percent; at temperatures, less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. Benjamin Moore & Co.
2. Sherwin-Williams Company (The).
3. Valspar Corporation

B. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to products listed in the Interior Painting Schedule for the paint category indicated.

2.2 PAINT, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.

C. 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/SEALER

A. Primer Sealer, Interior, Institutional Low Odor/VOC: MPI #149.

2.5 SOURCE QUALITY CONTROL

A. Testing of Paint Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample paint materials. Contractor will be notified in advance and may be present when samples are taken. If paint materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying paints if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying paint materials from Project site, pay for testing, and repaint surfaces painted with rejected materials. Contractor will be required to remove rejected materials from previously painted surfaces if, on repainting with complying materials, the two paints are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Maximum Moisture Content of Substrates: When measured with an electronic moisture meter as follows:

1. Concrete: 12 percent.

2. Masonry (Clay and CMUs): 12 percent.
3. Wood: 15 percent.
4. Gypsum Board: 12 percent.

C. Gypsum Board Substrates: Verify that finishing compound is sanded smooth.

D. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

E. 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 Architectural Painting Specification Manual" applicable to substrates and paint systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of paints, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

1. Remove incompatible primers and reprime substrate with compatible primers or apply tie coat as required to produce paint systems indicated.

D. Concrete Substrates: Remove release agents, curing compounds, efflorescence, and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces to be painted exceeds that permitted in manufacturer's written instructions.

E. Masonry Substrates: Remove efflorescence and chalk. Do not paint surfaces if moisture content or alkalinity of surfaces or mortar joints exceeds that permitted in manufacturer's written instructions.

F. Steel Substrates: Remove rust, loose mill scale, and shop primer, if any. Clean using methods recommended in writing by paint manufacturer. but not less than the following:

1. SSPC-SP 2.
2. SSPC-SP 3.
3. SSPC-SP 7/NACE No. 4.
4. SSPC-SP 11.

G. Shop-Primed Steel Substrates: Clean field welds, bolted connections, and areas where shop paint is abraded. Paint exposed areas with the same material as used for shop priming to comply with SSPC-PA 1 for touching up shop-primed surfaces.

H. Galvanized-Metal Substrates: Remove grease and oil residue from galvanized sheet metal by mechanical methods to produce clean, lightly etched surfaces that promote adhesion of subsequently applied paints.

I. Aluminum Substrates: Remove loose surface oxidation.

J. Wood Substrates:

1. Scrape and clean knots, and apply coat of knot sealer before applying primer.
2. Sand surfaces that will be exposed to view, and dust off.
3. Prime edges, ends, faces, undersides, and backsides of wood.
4. After priming, fill holes and imperfections in the finish surfaces with putty or plastic wood filler. Sand smooth when dried.

K. Cotton or Canvas Insulation Covering Substrates: Remove dust, dirt, and other foreign material that might impair bond of paints to substrates.

3.3 APPLICATION

A. Apply paints according to manufacturer's written instructions and to recommendations in "MPI Manual."

1. Use applicators and techniques suited for paint and substrate indicated.
2. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, paint surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Paint front and backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not paint over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.
5. Primers specified in painting schedules may be omitted on items that are factory primed or factory finished if acceptable to topcoat manufacturers.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of same material are to be applied. Tint undercoats to match color of topcoat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through topcoat, apply additional coats until cured film has a uniform paint finish, color, and appearance.

D. Apply paints to produce surface films without cloudiness, spotting, holidays, laps, brush marks, roller tracking, runs, sags, ropiness, or other surface imperfections. Cut in sharp lines and color breaks.

E. Painting Fire Suppression, Plumbing, HVAC, Electrical, Communication, and Electronic Safety and Security Work:

1. Paint the following work where exposed in equipment rooms:

    a. Equipment, including panelboards.
    b. Uninsulated metal piping.
    c. Uninsulated plastic piping.
    d. Pipe hangers and supports.
    e. Metal conduit.
    f. Plastic conduit.
    g. Tanks that do not have factory-applied final finishes.
    h. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.

2. Paint the following work where exposed in occupied spaces:

    a. Equipment, including panelboards.
    b. Uninsulated metal piping.
    c. Uninsulated plastic piping.
    d. Pipe hangers and supports.
    e. Metal conduit.
    f. Plastic conduit.
    g. Duct, equipment, and pipe insulation having cotton or canvas insulation covering or other paintable jacket material.
    h. Other items as directed by Architect.

3. Paint portions of internal surfaces of metal ducts, without liner, behind air inlets and outlets that are visible from occupied spaces.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test paint for dry film thickness.

1. Contractor shall touch up and restore painted surfaces damaged by testing.
2. If test results show that dry film thickness of applied paint does not comply with paint manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with paint manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing paint application, clean spattered surfaces. Remove spattered paints by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from paint application. Correct damage to work of other trades by cleaning, repairing, replacing, and refinishing, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced painted surfaces.

3.6 INTERIOR PAINTING SCHEDULE

A. Concrete Substrates, Nontraffic Surfaces:

1. Latex System MPI INT 3.1A:

a. Prime Coat: Primer, alkali resistant, water based, MPI #3.

1) Sherwin Williams PrepRite ProBlock Interior/Exterior Latex Primer/Sealer; B51W00046.

b. Prime Coat: Latex, interior, matching topcoat.
c. Intermediate Coat: Latex, interior, matching topcoat.
d. Topcoat: Latex, interior, flat (MPI Gloss Level 1), MPI #53.

1) Sherwin Williams Harmony Interior Acrylic Latex Flat; B05W01051.

B. Concrete Substrates, Traffic Surfaces:

1. Water-Based Concrete Floor Sealer System MPI INT 3.2G:

a. First Coat: Sealer, water based, for concrete floors, matching topcoat.
b. Topcoat: Sealer, water based, for concrete floors, MPI #99.
1) Sherwin Williams H & C Wet Look Sealer; 50.048054

C. CMU Substrates:

1. Latex System MPI INT 4.2A:

a. Block Filler: Block filler, latex, interior/exterior, MPI #4.

1) Sherwin Williams PrepRite Int./Ext. Block Filler; B25W00025.

b. Intermediate Coat: Latex, interior, matching topcoat.

c. Topcoat: Latex, interior (MPI Gloss Level 2), MPI #44.

1) Sherwin Williams ProMar 400 Zero VOC Interior Latex Eg-Shel; B20W04451.

D. Steel Substrates:

1. Institutional Low-Odor/VOC Latex System MPI INT 5.1S:

a. Prime Coat: Primer, rust inhibitive, water based MPI #107.

1) Sherwin Williams Pro Industrial Pro-Cryl Universal Primer; B66W310.

b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.

c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147.

1) Sherwin Williams Pro Industrial Emerald Interior Latex Semi-Gloss; K38W00351.

E. Galvanized-Metal Substrates:

1. Institutional Low-Odor/VOC Latex System MPI INT 5.3N:

a. Prime Coat: Primer, galvanized, water based, MPI #134.

1) Sherwin Williams Pro-Industrial Pro-Cryl Universal Primer B66W310.

b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.

c. Topcoat: Latex, interior, institutional low odor/VOC, semi-gloss (MPI Gloss Level 5), MPI #147.

1) Sherwin Williams All Surface Enamel HP Semi-Gloss; A41WQ8051.

F. Wood Substrates: Wood trim Architectural woodwork, stair stringers..

1. Latex over Latex Primer System MPI INT 6.3T:

a. Prime Coat: Primer, latex, for interior wood, MPI #39.

1) Sherwin Williams Multi-Purpose Multi-Purpose Latex Primer/Sealer; B51W00450.

b. Intermediate Coat: Latex, interior, matching topcoat.

c. Topcoat: Latex, interior, semi-gloss (MPI Gloss Level 5), MPI #54.

1) Sherwin Williams Emerald Interior Acrylic Latex Semi-Gloss; K38W00351.

G. Fiberglass Substrates:

1. Latex System MPI INT 6.7A:

a. Prime Coat: Primer, bonding, water based, MPI #17.

1) Sherwin Williams PrepRite ProBlock Interior/Exterior Latex Primer/Sealer.

b. Intermediate Coat: Latex, interior, matching topcoat.

c. Topcoat: Latex, interior, semi-gloss (MPI Gloss Level 5), MPI #54.

1) Sherwin Williams Emerald Interior Acrylic Latex Semi-Gloss; K38W00351.

H. Gypsum Board Substrates: Ceilings

1. Institutional Low-Odor/VOC Latex System MPI INT 9.2M:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.

1) Sherwin Williams ProMar 200 Zero VOC Interior Latex Primer; B28W02600.

b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.

c. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #144.

1) Sherwin Williams ProMar 200 Zero VOC Interior Latex Low Sheen; B24W02651.

I. Gypsum Board Substrates: Walls

1. Institutional Low-Odor/VOC Latex System MPI INT 9.2M:

a. Prime Coat: Primer sealer, interior, institutional low odor/VOC, MPI #149.

1) Sherwin Williams ProMar 200 Zero VOC Interior Latex Primer; B28W02600.

b. Intermediate Coat: Latex, interior, institutional low odor/VOC, matching topcoat.

c. Topcoat: Latex, interior, institutional low odor/VOC (MPI Gloss Level 4), MPI #144.

1) Sherwin Williams ProMar 200 Zero VOC Interior Latex Low Sheen; B24W02651.

J. Cotton or Canvas and ASJ Insulation-Covering Substrates: Including pipe and duct coverings.

1. Latex System MPI INT 10.1A:

a. Prime Coat: Primer sealer, latex, interior, MPI #50.

1) Sherwin Williams Harmony Interior Latex Primer; B111W01500.

b. Intermediate Coat: Latex, interior, matching topcoat.

c. Topcoat: Latex, interior (MPI Gloss Level 3), MPI #52.

1) Sherwin Williams ProMar 200 Zero VOC Interior Latex Eg-Shel; B20W02651.

END OF SECTION 099123

SECTION 099600 - HIGH-PERFORMANCE COATINGS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes surface preparation and the application of high-performance coating systems on the following substrates:

1. Exterior Substrates:
   a. Steel at railings, guard rails, balconies.

2. Interior Substrates:
   a. Steel at stairs guard rails and railings.

B. Related Requirements:

1. for shop priming of structural steel with primers specified in this Section.
2. Section 055000 “Metal Fabrications” for shop painting metal fabrication items.
3. Section 055118 “Metal Floor Plate Stairs” for shop painting metal floor plate stairs.
4. Section 055213 "Pipe and Tube Railings" for shop painting pipe and tube railings with coatings specified in this Section.
5. Section 099113 "Exterior Painting" for general field painting.
6. Section 099123 "Interior Painting" for general field painting.

1.3 DEFINITIONS

A. MPI Gloss Level 5: 35 to 70 units at 60 degrees, according to ASTM D 523.

B. MPI Gloss Level 6: 70 to 85 units at 60 degrees, according to ASTM D 523.

C. MPI Gloss Level 7: More than 85 units at 60 degrees, according to ASTM D 523.

1.4 ACTION SUBMITTALS

A. Product Data: For each type of product. Include preparation requirements and application instructions.

1. Include printout of current "MPI Approved Products List" for each product category specified, with the proposed product highlighted.

2. Indicate VOC content.

B. Sustainable Design Submittals:

1. Refer to Section 01 8113 for sustainable design submittal requirements for paints and coatings.

C. Samples for Initial Selection: For each type of topcoat product indicated.

D. Samples for Verification: For each type of coating system and each color and gloss of topcoat indicated.

1. Submit Samples on rigid backing, 8 inches (200 mm) square.
2. Apply coats on Samples in steps to show each coat required for system.
3. Label each coat of each Sample.
4. Label each Sample for location and application area.

E. Product List: Cross-reference to coating system and locations of application areas. Use same designations indicated on Drawings and in schedules. Include color designations.

1.5 MAINTENANCE MATERIAL SUBMITTALS

A. Furnish extra materials that match products installed and that are packaged with protective covering for storage and identified with labels describing contents.

1. Coatings: 5 percent, but not less than 1 gal. (3.8 L) of each material and color applied.

1.6 QUALITY ASSURANCE

A. Mockups: Apply mockups of each coating system indicated to verify preliminary selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.

1. Architect will select one surface to represent surfaces and conditions for application of each coating system.

a. Wall and Ceiling 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.

3. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups unless Architect specifically approves such deviations in writing.

4. Subject to compliance with requirements, approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Store materials not in use in tightly covered containers in well-ventilated areas with ambient temperatures continuously maintained at not less than 45 deg F (7 deg C).

1. Maintain containers in clean condition, free of foreign materials and residue.
2. Remove rags and waste from storage areas daily.

1.8 FIELD CONDITIONS

A. Apply coatings only when temperature of surfaces to be coated and ambient air temperatures are between 50 and 95 deg F (10 and 35 deg C).

B. Do not apply coatings when relative humidity exceeds 85 percent; at temperatures less than 5 deg F (3 deg C) above the dew point; or to damp or wet surfaces.

C. Do not apply exterior coatings in snow, rain, fog, or mist.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

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

1. PPG Architectural Coatings.
2. Sherwin-Williams Company (The).
3. Tnemec Inc.

B. Products: Subject to compliance with requirements, provide one of the products listed in the Exterior High-Performance Coating Schedule or Interior High-Performance Coating Schedule for the coating category indicated.

2.2 HIGH-PERFORMANCE COATINGS, GENERAL

A. MPI Standards: Products shall comply with MPI standards indicated and shall be listed in its "MPI Approved Products Lists."

B. Material Compatibility:

1. Materials for use within each paint system shall be 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, products shall be recommended in writing by topcoat manufacturers for use in paint system and on substrate indicated.
3. Products shall be of same manufacturer for each coat in a coating system.

C. Refer to Section 01 8113 for sustainable design submittal requirements for coatings.

D. Colors: As selected by Architect from manufacturer's full range.

2.3 SOURCE QUALITY CONTROL

A. Testing of Coating Materials: Owner reserves the right to invoke the following procedure:

1. Owner will engage the services of a qualified testing agency to sample coating materials. Contractor will be notified in advance and may be present when samples are taken. If coating materials have already been delivered to Project site, samples may be taken at Project site. Samples will be identified, sealed, and certified by testing agency.
2. Testing agency will perform tests for compliance with product requirements.
3. Owner may direct Contractor to stop applying coatings if test results show materials being used do not comply with product requirements. Contractor shall remove noncomplying coating materials from Project site, pay for testing, and recoat surfaces coated with rejected materials. Contractor will be required to remove rejected materials from previously coated surfaces if, on recoating with complying materials, the two coatings are incompatible.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and conditions, with Applicator present, for compliance with requirements for maximum moisture content and other conditions affecting performance of the Work.

B. Verify suitability of substrates, including surface conditions and compatibility, with existing finishes and primers.

C. 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 Architectural Painting Specification Manual" applicable to substrates and coating systems indicated.

B. Remove hardware, covers, plates, and similar items already in place that are removable and are not to be painted. If removal is impractical or impossible because of size or weight of item, provide surface-applied protection before surface preparation and painting.

1. After completing painting operations, use workers skilled in the trades involved to reinstall items that were removed. Remove surface-applied protection if any.

C. Clean substrates of substances that could impair bond of coatings, including dust, dirt, oil, grease, and incompatible paints and encapsulants.

D. Steel Substrates: Remove rust, loose mill scale, and shop primer if any. Clean using methods recommended in writing by paint manufacturer but not less than the following:
1. Steel Preparation: SSPC-SP 6/NACE No. 3.

3.3 APPLICATION

A. Apply high-performance coatings according to manufacturer's written instructions and recommendations in "MPI Architectural Painting Specification Manual."

1. Use applicators and techniques suited for coating and substrate indicated.
2. Coat surfaces behind movable equipment and furniture same as similar exposed surfaces. Before final installation, coat surfaces behind permanently fixed equipment or furniture with prime coat only.
3. Coat backsides of access panels, removable or hinged covers, and similar hinged items to match exposed surfaces.
4. Do not apply coatings over labels of independent testing agencies or equipment name, identification, performance rating, or nomenclature plates.

B. Tint each undercoat a lighter shade to facilitate identification of each coat if multiple coats of the same material are to be applied. Tint undercoats to match color of finish coat, but provide sufficient difference in shade of undercoats to distinguish each separate coat.

C. If undercoats or other conditions show through final coat, apply additional coats until cured film has a uniform coating finish, color, and appearance.

D. Apply coatings to produce surface films without cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness, or other surface imperfections. Produce sharp glass lines and color breaks.

3.4 FIELD QUALITY CONTROL

A. Dry Film Thickness Testing: Owner may engage the services of a qualified testing and inspecting agency to inspect and test coatings for dry film thickness.

1. Contractor shall touch up and restore coated surfaces damaged by testing.
2. If test results show that dry film thickness of applied coating does not comply with coating manufacturer's written recommendations, Contractor shall pay for testing and apply additional coats as needed to provide dry film thickness that complies with coating manufacturer's written recommendations.

3.5 CLEANING AND PROTECTION

A. At end of each workday, remove rubbish, empty cans, rags, and other discarded materials from Project site.

B. After completing coating application, clean spattered surfaces. Remove spattered coatings by washing, scraping, or other methods. Do not scratch or damage adjacent finished surfaces.

C. Protect work of other trades against damage from coating operation. Correct damage to work of other trades by cleaning, repairing, replacing, and recoating, as approved by Architect, and leave in an undamaged condition.

D. At completion of construction activities of other trades, touch up and restore damaged or defaced coated surfaces.

3.6 EXTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates:

1. Exterior Steel Application: Pigmented Polyurethane over Inorganic Zinc-Rich Primer and High-Build Epoxy System :

a. Prime Coat: Primer, zinc rich, inorganic,

1) Tnemec Zinc-Rich Urethane/Inorganic Water-Based Epoxy/Fluoropolymer; Primer Series 94-H20 Hydro-Zinc, DFT 2.5 – 3.5 mils.

b. Intermediate Coat: Inorganic Water-Based Epoxy, high build, low gloss,

1) Tnemec Zinc-Rich Urethane/Inorganic Water-Based Epoxy/Fluoropolymer; Series 27WB Typoxy, DFT 4.0 to 6.0 mils.

c. Topcoat: Polyurethane, two component, pigmented, gloss (MPI Gloss Level 5).

1) Tnemec Zinc-Rich Urethane/Inorganic Water-Based Epoxy/Fluoropolymer; Series 1095 Endura-Shield, DFT 2.0 to 3.0 mils.

d. Total DFT: 8.5 to 12.5 mils..

3.7 INTERIOR HIGH-PERFORMANCE COATING SCHEDULE

A. Steel Substrates:

1. Epoxy-Acrylic -System :

a. Prime Coat: Primer, rust inhibitive, water based.

1) Tnemec Primer (Field) Series 94 H2O Hydro-Zinc, DFT 2.5 to 3.5 mils.

b. Intermediate Coat: -Acrylic, interior, matching topcoat.

c. Topcoat: Acrylic, gloss (MPI Gloss Level 5)].

1) Tnemec Series 1029 Enduratone (semi-gloss), DFT 2.0 to 3.0 mils.

END OF SECTION 099600

SECTION 101423 - PANEL SIGNAGE

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:
   1. Room-identification signs.

1.3 DEFINITIONS

A. Accessible: In accordance with the accessibility standard.

B. Illuminated: Illuminated by lighting source integrally constructed as part of the sign unit.

1.4 COORDINATION

A. Furnish templates for placement of sign-anchorage devices embedded in permanent construction by other installers.

B. Furnish templates for placement of electrical service embedded in permanent construction by other installers.

1.5 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For panel 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, including raised characters and Braille, and layout for each sign at least half size.
   4. Show locations of electrical service connections.
   5. Include diagrams for power, signal, and control wiring.

C. Samples for Initial Selection: For each type of sign assembly, exposed component, and exposed finish.

1. Include representative Samples of available typestyles and graphic symbols.

D. Samples for Verification: For each type of sign assembly showing all components and with the required finish(es), in manufacturer's standard size unless otherwise indicated and as follows:

1. Panel Signs: Full-size Sample.
2. Room-Identification Signs: Full-size Sample.
3. Exposed Accessories: Full-size Sample of each accessory type.

E. Sign Schedule: Use same designations specified or indicated on Drawings or in a sign schedule.

1.6 INFORMATIONAL SUBMITTALS

A. Qualification Data: For Installer and manufacturer.

B. Sample Warranty: For special warranty.

1.7 CLOSEOUT SUBMITTALS

A. Maintenance Data: For signs to include in maintenance manuals.

1.8 QUALITY ASSURANCE

A. Installer Qualifications: Manufacturer of products.

1.9 FIELD CONDITIONS

A. Field Measurements: Verify locations of anchorage devices embedded in permanent construction by other installers by field measurements before fabrication, and indicate measurements on Shop Drawings.

1.10 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of signs that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of finishes beyond normal weathering.
b. Deterioration of embedded graphic image.
c. Separation or delamination of sheet materials and components.

2. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL SIGNS, GENERAL

2.2 SIGNS

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

1. ACE Sign Systems, Inc.
2. Allen Industries Architectural Signage.
3. APCO Graphics, Inc.
4. Mohawk Sign Systems.
5. Vista System.

B. Room-Identification Sign: Sign with smooth, uniform surfaces; with message and characters having uniform faces, sharp corners, and precisely formed lines and profiles; and as follows:

1. Basis-of-Design Product: Indicated on Drawings.
2. Laminated-Sheet Sign: Photopolymer face sheet with raised graphics laminated over subsurface graphics to acrylic or phenolic backing sheet to produce composite sheet.

    a. Composite-Sheet Thickness: Manufacturer's standard for size of sign.

3. Sign-Panel Perimeter: Finish edges smooth.

    a. Edge Condition: Square cut.
    b. Corner Condition in Elevation: Square.

4. Mounting: Manufacturer's standard method for substrates indicated with concealed anchors .
5. Text and Typeface: Accessible raised characters and Braille typeface as indicated by manufacturer's designation typeface as selected by Architect from manufacturer's full range. Finish raised characters to contrast with background color, and finish Braille to match background color.

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.

2.4 FABRICATION

A. General: Provide manufacturer's standard sign assemblies according to requirements indicated.

1. Preassemble signs and assemblies in the shop to greatest extent possible. Disassemble signs and assemblies only as necessary for shipping and handling limitations. Clearly mark units for reassembly and installation; apply markings in locations concealed from view after final assembly.
2. Mill joints to a tight, hairline fit. Form assemblies and joints exposed to weather to resist water penetration and retention.
3. Comply with AWS for recommended practices in welding and brazing. 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.
4. Conceal connections if possible; otherwise, locate connections where they are inconspicuous.
5. Internally brace signs for stability and for securing fasteners.
6. 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.

B. Surface-Engraved Graphics: Machine engrave characters and other graphic devices into panel surface indicated to produce precisely formed copy, incised to uniform depth.

1. Engraved Metal: Fill engraved graphics with manufacturer's standard baked enamel.
2. Engraved Opaque Acrylic Sheet: Fill engraved graphics with manufacturer's standard enamel.
3. Face-Engraved Clear Acrylic Sheet: Fill engraved copy with manufacturer's standard enamel. Apply manufacturer's standard opaque background color coating to back face of acrylic sheet.
4. Engraved Plastic Laminate: Engrave through exposed face ply of plastic-laminate sheet to expose contrasting core ply.

C. Subsurface-Engraved Graphics: Reverse engrave back face of clear face-sheet material. Fill resulting copy with manufacturer's standard enamel. Apply opaque manufacturer's standard background color coating over enamel-filled copy.

2.5 GENERAL FINISH REQUIREMENTS

A. Protect mechanical finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

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

C. Directional Finishes: Run grain with long dimension of each piece and perpendicular to long dimension of finished trim or border surface unless otherwise indicated.

D. Organic, Anodic, and Chemically Produced Finishes: Apply to formed metal after fabrication but before applying contrasting polished finishes on raised features unless otherwise indicated.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of signage work.

B. Verify that sign-support surfaces are within tolerances to accommodate signs without gaps or irregularities between backs of signs and support surfaces unless otherwise indicated.

C. Verify that anchor inserts are correctly sized and located to accommodate signs.

D. Verify that electrical service is correctly sized and located to accommodate signs.

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

3.2 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. Install signs so they do not protrude or obstruct according to the accessibility standard.
3. Before installation, verify that sign surfaces 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.

B. Room-Identification Signs and Other Accessible Signage: Install in locations on walls as indicated and according to accessibility standard.

C. 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.

D. Field-Applied, Vinyl-Character Signs: Clean and dry substrate. Align sign characters in final position before removing release liner. Remove release liner in stages, and apply and firmly press characters into final position. Press from the middle outward to obtain good bond without blisters or fishmouths. Remove carrier film without disturbing applied vinyl film.

E. Signs Mounted on Glass: Provide opaque sheet matching sign material and finish onto opposite side of glass to conceal back of sign.

3.3 ADJUSTING AND CLEANING

A. Remove and replace damaged or deformed signs and signs that do not comply with specified requirements. Replace signs with damaged or deteriorated finishes or components that cannot be successfully repaired by finish touchup or similar minor repair procedures.

B. Remove temporary protective coverings and strippable films as signs are installed.

C. On completion of installation, clean exposed surfaces of signs according to manufacturer's written instructions, and touch up minor nicks and abrasions in finish. Maintain signs in a clean condition during construction and protect from damage until acceptance by Owner.

END OF SECTION 101423

SECTION 10 21 13.17
PHENOLIC CORE TOILET COMPARTMENTS

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Phenolic core compartment partitions for following applications:
      a. Toilet enclosures.
      b. Privacy screens.
      c. Urinal screens.

B. Related Requirements:
   1. Division 03 Section "Cast in Place Concrete" for compartment anchorage to concrete substrates.
   2. Division 04 Section "Unit Masonry" for compartment anchorage to masonry substrates.
   3. Division 05 Section "Metal Fabrications" for miscellaneous structural and support metal components required to secure compartments.
   4. Division 06 Section "Rough Carpentry" for compartment anchorage to frame walls.

1.2 REFERENCES

A. ASTM International (ASTM):
   1. ASTM A 240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
   2. ASTM A 666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
   3. ASTM A 743/A 743M - Standard Specification for Castings, Iron-Chromium, Iron-Chromium-Nickel, Corrosion Resistant, for General Application.
   4. ASTM B 86 - Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy Foundry and Die Castings.
   5. ASTM B 221 - Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
   6. ASTM E 84 - Standard Test Method for Surface Burning Characteristics of Building Materials.

B. International Code Council (ICC)/American National Standards Institute (ANSI):
   1. ICC/ANSI A117.1 - Accessible and Usable Buildings and Facilities, as applicable to toilet compartments designated as accessible.

C. United States Department of Justice:
   1. ADA - Americans with Disabilities Act, Excerpt from 28 CFR Part 36 - ADA Standards for Accessible Design.

D. GREENGUARD Environmental Institute (GREENGUARD):
   1. GREENGUARD certified low emitting products.

1.3 ACTION SUBMITTALS

A. Product Data: Manufacturer's data sheets for each type of product indicated. Include fabrication details, description of materials and finishes.
   1. Product Test Reports: When requested by Architect, submit documentation by qualified independent testing agency indicating compliance of products with requirements.

B. Shop Drawings: Include overall product dimensions, floor plan, elevations, sections, details, and attachments to other work. Include choice of options with details.

C. Samples for Selection: Furnish samples of manufacturer's full range of colors for initial selection.

D. Samples for Verification: Furnish physical sample of material in selected color.
   1. Size: 2 by 2 inch (52 by 52 mm) minimum, in type of finish specified.

E. LEED Submittals:
   1. Product Data for Credit MR 4: For products having recycled content, documentation indicating percentages by weight of postconsumer and preconsumer recycled content. Include breakout costs for each product with recycled content.
   2. Laboratory Test Reports for Credit IEQ 4: 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."

1.4 INFORMATIONAL SUBMITTALS

A. Warranty: Sample of special warranty.

1.5 CLOSEOUT SUBMITTALS

A. Maintenance and cleaning instructions.

1.6 QUALITY ASSURANCE

A. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum **[**5**]** years experience in the manufacture of toilet compartments.

B. Manufacturer Qualifications: Approved manufacturer listed in this section, with minimum **[**5**]** years experience in the manufacture of toilet compartments. Manufacturers seeking approval must submit the following in accordance with Instructions to Bidders and Division 01 requirements:
   1. Product data, including test data from qualified independent testing agency indicating compliance with requirements.
   2. Samples of each component of product specified.
   3. List of successful installations of similar products available for evaluation by Architect.

C. Installers Qualifications: Experienced Installer regularly engaged in installation of toilet compartments for minimum 3 years.

D. Source Limitations: Obtain toilet compartment components and accessories from single manufacturer.

E. Accessibility Requirements: Comply with requirements of ICC/ANSI 117.1, and with requirements of authorities having jurisdiction.

F. Surface-Burning Characteristics: As determined by testing identical products according to ASTM E 84 by qualified testing agency. Identify products with appropriate markings of applicable testing agency.
   1. Flame-Spread Index: 55-60.
   2. Smoke-Developed Index: 165-250.

G. Indoor Environmental Quality Certification: Provide certificate indicated that products have been certified under the following programs, or a comparable certification acceptable to Owner:
   1. GREENGUARD Indoor Air Quality Certified.
   2. GREENGUARD Certified for Children and Schools.

1.7 DELIVERY, STORAGE, AND HANDLING

A. Do not deliver toilet compartments to site until building is enclosed and HVAC systems are in operation.
   1. Deliver toilet compartments in manufacturer's original packaging.
   2. Store laying flat.

1.8 WARRANTY

A. Special Manufacturer's Warranty: Provide manufacturer's standard form in which manufacturer agrees to repair or replace products that fail in materials or workmanship during the following period after substantial completion:
   1. Phenolic Core Toilet Partitions: Against delamination: 3 years.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Basis-of-Design Manufacturer: Subject to compliance with requirements, provide products of **Bradley Corporation, Mills Metals Division, Menomonee Falls, WI 53051**.
   1. Contact Information: (800)272-3539, fax (262)251-5817; Email info@BradleyCorp.com; Website www.bradleycorp.com.

2.2 MATERIALS

A. Phenolic Core: Compressed cellulose impregnated with phenolic resins. Provide smooth material, without creases or ripples.

B. Zinc Aluminum Magnesium and Copper Alloy (Zamac): ASTM B 86.

C. Stainless Steel Sheet: ASTM A 240 or A 666, 300 series.

D. Stainless Steel Castings: ASTM A 743/A 743M.

E. Aluminum: ASTM B 221.

2.3 PHENOLIC CORE TOILET COMPARTMENTS

A. Toilet Compartment Type:
   1. Floor mounted overhead braced..
      a. Basis of Design Product: Bradley, Mills Partitions, Sentinel, Series 400.
   2. Floor anchored.
      a. Basis of Design Product: Bradley, Mills Partitions, Floor Braced, Series 500.
   3. Ceiling hung.
      a. Basis of Design Product: Bradley, Mills Partitions, Ceiling Hung, Series 600.
   4. Floor and ceiling anchored.
      a. Basis of Design Product: Bradley, Mills Partitions, Floor to Ceiling, Series 700.

B. Sight Screen Type:
   1. Floor mounted overhead braced.
      a. Basis of Design Product: Bradley, Mills Partitions, Floor Braced, Series 400.
   2. Floor anchored.
      a. Basis of Design Product: Bradley, Mills Partitions, Floor Braced, Series 500.
   3. Floor and ceiling anchored.
      a. Basis of Design Product: Bradley, Mills Partitions, Floor to Ceiling, Series 700.
   4. Aluminum post mounted.
      a. Basis of Design Product: Bradley, Mills Partitions.

C. Urinal Screen Style:

1. Wall hung with stirrup bracket:
    a. Basis of Design Product: Bradley, Mills Partitions.
    b. Provide stainless steel stirrup bracket for mounting to wall.
2. Floor braced pilaster:
    a. Basis of Design Product: Bradley, Mills Partitions.
    b. Floor mounted, requiring concrete floor, minimum 3 inches thick for anchoring.
    c. Where indicated on Drawings, modify to become floor-to-ceiling mounted by changing mounting pilaster.
3. Floor to ceiling pilaster:
    a. Basis of Design Product: Bradley, Mills Partitions.
4. Aluminum post mounted:
    a. Basis of Design Product: Bradley, Mills Partitions.

D. Door, Panel, and Pilaster Construction, General: All edges are black, machined and finished smooth with a 45-degree chamfered edge.
1. Provide exposed surfaces free of pitting, visible seams and fabrication marks, stains, telegraphing of core material, or other imperfections.
2. Core Material: Manufacturer's standard solid resin core of thickness required to provide finished thickness for doors, panels and pilasters.
3. No-Sight Feature: Rabbeted edge on doors and pilasters at hinge and latch side to provide full privacy.

E. Door Construction: 3/4 inch (19 mm) thick.

F. Panel Construction: 1/2 inch (13 mm) thick.

G. Pilaster Construction: 3/4 inch (19 mm) thick.
1. Provide pilaster with stainless steel mechanical fasteners for leveling.

H. Headrail: Extruded anodized aluminum headrail with anti-grip profile. Provide clamps for attachment to pilaster and stainless steel brackets to secure to wall.

I. Shoes: 4 inches (102 mm) high minimum, Type 304 stainless steel with No. 4 satin brushed finish. Provide concealed retainer clips to attach to pilaster.

J. Urinal-Screen Construction: Matching toilet compartment panel construction

K. Urinal-Screen Post: Manufacturer's standard post design of **[**material matching the thickness and construction of pilasters**][** or**][** 1-3/4-inch- (44-mm-) square, aluminum tube with satin finish**]**; with shoe**[** and sleeve (cap)**]** matching that on the pilaster.

L. Brackets (Fittings):
1. Stirrup Type: Ear or U-brackets; stainless steel.
2. Full-Height (Continuous) Type: Manufacturer's standard design; stainless steel.

M. Phenolic Core Finish: Manufacturer's standard impregnated, with **[**one color**][**two colors**]** in each room.
1. Color: As selected by Architect from manufacturer's full line.

2.4 HARDWARE

A. Hardware: Manufacturer's stainless steel castings with satin brushed finish, including stainless steel tamper-resistant fasteners:
1. Hinges: Self-closing surface mounted, through bolted, with gravity cams, adjustable to hold doors open at any angle up to 90 degrees, with emergency access by lifting door.
2. Door Latch and Keeper: Surface-mounted, indicator slide latch with emergency egress requires no twisting motion and complies with all Federal ADA guidelines. Keeper is mounted to the pilaster. Theft resistant fasteners are supplied with all the hardware.

3. Coat Hook: Combination hook and rubber-tipped stop, sized to prevent door from hitting compartment-mounted accessories. Provide wall bumper where door abuts wall. Provide formed L-shaped hook without stop at outswing doors. Mount with stainless steel through-bolts.
4. Door Pull: Standard unit on outside of inswing doors. Provide pulls on both sides of outswing doors.

2.5 FABRICATION

A. Overhead-Braced Units: Provide manufacturer's standard corrosion-resistant supports, leveling mechanism, and anchors at pilasters to suit floor conditions. Provide shoes at pilasters to conceal supports and leveling mechanism.

B. Floor-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment brackets at pilasters for structural connection to floor. Provide shoes at pilasters to conceal anchorage.

C. Ceiling-Hung Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment brackets at pilasters for connection to structural support above finished ceiling. Provide assemblies that support pilasters from structure without transmitting load to finished ceiling. Provide sleeves (caps) at tops of pilasters to conceal anchorage.

D. Floor-and-Ceiling-Anchored Units: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at tops and bottoms of pilasters. Provide shoes and sleeves (caps) at pilasters to conceal anchorage.

E. Urinal-Screen Posts: Provide manufacturer's standard corrosion-resistant anchoring assemblies with leveling adjustment at**[** tops and**]** bottoms of posts. Provide caps, shoes, and covers at posts to conceal anchorage.

F. Door Size and Swings: Unless otherwise indicated, provide 26-inch- (660-mm-) wide, in-swinging doors for standard toilet compartments and 36-inch- (914-mm-) wide, out-swinging doors with a minimum 32-inch- (813-mm-) wide clear opening for compartments designated as accessible.

G. Provide extended height panels as indicated on the Drawings as a stacked panel with an H-bracket joinery to panel below.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine work area to verify that measurements, substrates, supports, and environmental conditions are in accordance with manufacturer's requirements to allow installation.
1. Proceed with installation once conditions meet manufacturer's requirements.

3.2 INSTALLATION

A. General: Comply with manufacturer's written installation instructions. Install units rigid, straight, level, and plumb. Secure units in position with manufacturer's recommended anchoring devices.

B. Install toilet partitions and screens in spaces with operating, temperature controlled HVAC systems. Shield partitions and screens from direct sunlight.

C. Clearances: Install with clearances indicated on Drawings. Where clearances are not indicated, allow maximum 1/2 inch (13 mm) between pilasters and panels, and 1 inch (25 mm) between panels and walls.

D. Stirrup Brackets: Secure panels to walls and to pilasters with no fewer than [two brackets attached][three brackets attached at midpoint and] near top and bottom of panel. Locate wall brackets so holes for wall anchors occur in masonry or tile joints. Align brackets at pilasters with brackets at walls.

3.3 ADJUSTING

A. Hardware Adjustment: Adjust and lubricate hardware according to hardware manufacturer's written instructions for proper operation. Set hinges on in-swinging doors to hold doors open approximately 15 degrees from closed position when unlatched. Set hinges on out-swinging doors[and doors in privacy screens] to return doors to fully closed position.

3.4 FINAL CLEANING

A. Remove packaging and construction debris and legally dispose of off-site.

B. Clean partition and screen surfaces with materials and cleansers in accordance with manufacturer's recommendations.

END OF SECTION

SECTION 104413 - FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section Includes:

1. Fire protection cabinets for the following:

a. Portable fire extinguishers.

B. Related Sections:

1. Division 09 painting Sections for field painting fire protection cabinets.
2. Division 10 Section "Signage" for directional signage to out-of-sight fire extinguishers and cabinets.
3. Division 10 Section "Fire Extinguishers."
4. Division 21 Section "Water-Based Fire-Suppression Systems" for hose systems, racks, and valves.
5. Division 26 Sections for low-voltage wiring for fire protection cabinet alarms.
6. Division 26 Section "Interior Lighting" for fire extinguisher location lights.

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for fire protection cabinets.

1. Fire Protection Cabinets: Include roughing-in dimensions, details showing mounting methods, relationships of box and trim to surrounding construction, door hardware, cabinet type, trim style, and panel style.

B. Shop Drawings: For fire protection cabinets. Include plans, elevations, sections, details, and attachments to other work.

C. Maintenance Data: For fire protection cabinets to include in maintenance manuals.

1.4 QUALITY ASSURANCE

A. 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.

B. Preinstallation Conference: Conduct conference at Project site .

1. Review methods and procedures related to fire protection cabinets including, but not limited to, the following:

    a. Schedules and coordination requirements.

1.5 COORDINATION

A. Coordinate size of fire protection cabinets to ensure that type and capacity of fire extinguishers indicated are accommodated.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Cold-Rolled Steel Sheet: ASTM A 1008/A 1008M, Commercial Steel (CS), Type B.

B. Stainless-Steel Sheet: ASTM A 666, Type 304.

C. Tempered Break Glass: ASTM C 1048, Kind FT, Condition A, Type I, Quality q3, 1.5 mm thick.

2.2 FIRE PROTECTION CABINET

A. Cabinet Type: Suitable for fire extinguisher .

1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
    a. J. L. Industries, Inc., a division of Activar Construction Products Group; .
    b. Larsen's Manufacturing Company; .
    c. Potter Roemer LLC; .

B. Cabinet Construction: Nonrated or 1-hour fire rated where required .

1. Fire-Rated Cabinets: Construct fire-rated cabinets with double walls fabricated from 0.0428-inch- (1.1-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: Steel sheet.

D. Semirecessed Cabinet: Cabinet box partially recessed in walls of sufficient depth to suit style of trim indicated; with one-piece combination trim and perimeter door frame overlapping surrounding wall surface with exposed trim face and wall return at outer edge (backbend). Provide where walls are of insufficient depth for recessed cabinets but are of sufficient depth to accommodate semirecessed cabinet installation.

1. Square-Edge Trim: 1-1/4- to 1-1/2-inch (32- to 38-mm) backbend depth.

E. Cabinet Trim Material: Stainless-steel sheet Same material and finish as door.

F. Door Material: Stainless-steel sheet .

G. Door Style: Fully glazed panel with frame .

H. Door Glazing: Tempered break glass .

I. Door Hardware: Manufacturer's standard door-operating hardware of proper type for cabinet type, trim style, and door material and style indicated.

1. Provide manufacturer's standard.
2. Provide manufacturer's standard hinge permitting door to open 180 degrees.

J. Accessories:

1. Mounting Bracket: Manufacturer's standard steel, designed to secure fire extinguisher to fire protection cabinet, of sizes required for types and capacities of fire extinguishers indicated, with plated or baked-enamel finish.
2. Door Lock: Cylinder lock, keyed alike to other cabinets.
3. 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 glazing .
2) Application Process: Silk-screened .
3) Lettering Color: White.
4) Orientation: Vertical .

K. Finishes:

1. Manufacturer's standard baked-enamel paint for the following:
   a. Interior of cabinet.
2. Steel: Baked enamel or powder coat.
3. Stainless Steel: No. 4 .

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.

1. Weld joints and grind smooth.
2. Provide factory-drilled mounting holes.
3. Prepare doors and frames to receive locks.
4. Install door locks at factory.

B. Cabinet Doors: Fabricate doors according to manufacturer's standards, from materials indicated and coordinated with cabinet types and trim styles selected.
1. Miter and weld perimeter door frames.

C. Cabinet Trim: Fabricate cabinet trim in one piece with corners mitered, welded, and ground smooth.

2.4 GENERAL FINISH REQUIREMENTS

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

B. Protect mechanical finishes on exposed surfaces of fire protection cabinets from damage by applying a strippable, temporary protective covering before shipping.

C. Finish fire protection cabinets after assembly.

D. Appearance of Finished Work: Noticeable variations in same piece are not acceptable. Variations in appearance of adjoining components are acceptable if they are within the range of approved Samples and are assembled or installed to minimize contrast.

2.5 STEEL FINISHES

A. Surface Preparation: Remove mill scale and rust, if present, from uncoated steel, complying with SSPC-SP 5/NACE No. 1, "White Metal Blast Cleaning" or SSPC-SP 8, "Pickling" . After cleaning, apply a conversion coating suited to the organic coating to be applied over it.

B. Baked-Enamel or Powder-Coat Finish: Immediately after cleaning and pretreating, apply manufacturer's standard two-coat, baked-on finish consisting of prime coat and thermosetting topcoat. Comply with coating manufacturer's written instructions for applying and baking to achieve a minimum dry film thickness of 2 mils (0.05 mm).

1. Color and Gloss: As selected by Architect from manufacturer's full range .

2.6 STAINLESS-STEEL FINISHES

A. Surface Preparation: Remove tool and die marks and stretch lines, or blend into finish.

B. Polished Finishes: Grind and polish surfaces to produce uniform finish, free of cross scratches.

1. Run grain of directional finishes with long dimension of each piece.
2. When polishing is completed, passivate and rinse surfaces. Remove embedded foreign matter and leave surfaces chemically clean.
3. Directional Satin Finish: No. 4.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine walls and partitions for suitable framing depth and blocking where [**recessed**] semirecessed cabinets will be installed.

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

3.2 PREPARATION

A. Prepare recesses for semirecessed fire protection cabinets as required by type and size of cabinet and trim style.

3.3 INSTALLATION

A. General: Install fire protection cabinets in locations and at mounting heights indicated or, if not indicated, at heights indicated below or at heights acceptable to authorities having jurisdiction.

1. Fire Protection Cabinets: 54 inches (1372 mm) above finished floor to top of cabinet.

B. Fire Protection Cabinets: Fasten cabinets to structure, square and plumb.
1. Provide inside latch and lock for break-glass panels.
2. Fasten mounting brackets to inside surface of fire protection cabinets, square and plumb.

3.4 ADJUSTING AND CLEANING

A. Remove temporary protective coverings and strippable films, if any, as fire protection cabinets are installed unless otherwise indicated in manufacturer's written installation instructions.

B. Adjust fire protection cabinet doors to operate easily without binding. Verify that integral locking devices operate properly.

C. On completion of fire protection cabinet installation, clean interior and exterior surfaces as recommended by manufacturer.

D. Touch up marred finishes, or replace fire protection cabinets that cannot be restored to factory-finished appearance. Use only materials and procedures recommended or furnished by fire protection cabinet and mounting bracket manufacturers.

E. Replace fire protection cabinets that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.

END OF SECTION 104413

SECTION 104416 - FIRE EXTINGUISHERS

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

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

1.2 SUMMARY

A. Section includes portable, hand-carried fire extinguishers.

B. Related Sections:

1. Division 10 Section "Fire Extinguisher Cabinets."

1.3 SUBMITTALS

A. Product Data: For each type of product indicated. Include rating and classification, material descriptions, dimensions of individual components and profiles, and finishes for fire extinguisher.

B. Operation and Maintenance Data: For fire extinguishers to include in maintenance manuals.

C. Warranty: Sample of special warranty.

1.4 QUALITY ASSURANCE

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.

1. Provide fire extinguishers approved, listed, and labeled by FMG.

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. Failures include, but are not limited to, the following:

   a. Failure of hydrostatic test according to NFPA 10.
   b. Faulty operation of valves or release levers.

2. Warranty Period: Six years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PORTABLE, HAND-CARRIED FIRE EXTINGUISHERS

A. Fire Extinguishers: Type, size, and capacity for each fire protection cabinet indicated. Provide extinguisher type(s) as required by local jurisdiction for each fire cabinet location.

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. J. L. Industries, Inc.; a division of Activar Construction Products Group.
   b. Larsen's Manufacturing Company.
   c. Potter Roemer LLC.
2. Handles and Levers: Manufacturer's standard .
3. Instruction Labels: Include pictorial marking system complying with NFPA 10, Appendix B.

B. Multipurpose Dry-Chemical Type : UL-rated nominal capacity, with monoammonium phosphate-based dry chemical in manufacturer's standard enameled container.

C. Clean-Agent Type in Aluminum Container : UL-rated 2-B:C, 2.5-lb (1.1-kg) nominal capacity, with HCFC Blend B agent and inert material in enameled-aluminum container; with pressure-indicating gage.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine fire extinguishers for proper charging and tagging.

1. Remove and replace damaged, defective, or undercharged fire extinguishers.

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

3.2 INSTALLATION

A. General: Install fire extinguishersin locations indicated and in compliance with requirements of authorities having jurisdiction.

END OF SECTION 104416

SECTION 105126
HDPE LOCKERS - ASI STORAGE SOLUTIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Standard-duty HDPE lockers.

1.02 RELATED REQUIREMENTS

A. Section **033000 - Cast-in-Place Concrete**: Concrete base construction.

B. Section **061000 - Rough Carpentry**: Wood blocking and nailers.

1.03 REFERENCE STANDARDS

A. ADA Standards - 2010 ADA Standards for Accessible Design; 2010.

B. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials; 2026.

C. ICC A117.1 - Accessible and Usable Buildings and Facilities; 2017.

1.04 SUBMITTALS

A. See Section **013000 - Administrative Requirements** for submittal procedures.

B. Product Data: Manufacturer's published data on locker construction, sizes, and accessories for each product used.
   1. Care and maintenance information.

C. Shop Drawings: Indicate locker plan layout, including minimum required dimensions for installation, **[elevations of each locker type] [numbering pattern] [_____]**.

D. Samples: **[Two] [____]**, **[3 by 3 inches (76 by 76 mm)] [[_____] by [_____] inches ([_____] by [_____] mm)]** in size, indicating and **[color] [finish]** of locker material.

E. Manufacturer's Instructions: Indicate installation of each configuration indicated.

F. Manufacturer's qualification statement.

1.05 QUALITY ASSURANCE

A. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with minimum **[three] [_____]** years **documented** experience.

1.06 DELIVERY, STORAGE, AND HANDLING

A. See Section **017419 - Construction Waste Management and Disposal** for packaging waste requirements.

B. Protect locker finish and adjacent surfaces from damage.

C. Inspect lockers and benches upon receipt of delivery, and store in secure area until ready for assembly or installation.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. ASI Storage Solutions: www.asi-storage.com.

2.02 PERFORMANCE REQUIREMENTS

A. Accessibility: Comply with and **[ICC A117.1] [ADA Standards, Accessibility Guidelines]**.

2.03 STANDARD-DUTY HDPE LOCKERS

A. **[<drawing designation>] and [_____]**: Student Lockers, Traditional HDPE Collection by ASI Storage Solutions.
   1. Selectable Attributes:
      a. Locker Configuration: Single tier.

b. Accessible Units: Lockers constructed to comply with referenced accessibility standards are **[indicated on drawings] [indicated in schedule] [_____]**.
c. Width: 12 inches (305 mm).
d. Depth: 18 inches (457 mm).
e. Enclosed Locker Height: 60 inches (152 cm).
f. Interior Color: Manufacturer's standard, homogeneous, natural color throughout.
g. Exterior Color: **[Selected from manufacturer's standard colors]**
h. Ventilation Type: **[Horizontal slotted door]**

2. Innate Attributes:
   a. Locker Body Components: Made of solid plastic panels of the following type and minimum thicknesses:
      1) Solid, High-Density Polyethylene (HDPE): Tested in accordance with ASTM E84, Class B; homogeneous color throughout.
         (a) Smoke Developed Index: Not to exceed 450.
         (b) Flame Spread Index: Not to exceed 75.
   b. HDPE Component Thickness:
      1) Door and Door Frame: **1/2 inch (13 mm)**.
      2) Back: **3/8 inch (9.5 mm)**, minimum.
      3) Side: **3/8 inch (9.5 mm)**, minimum.
      4) Top: **3/8 inch (9.5 mm)**, minimum.
      5) Shelf: **3/8 inch (9.5 mm)**, minimum.
      6) Bottom: **3/8 inch (9.5 mm)**, minimum.
   c. Door Frame: Manufactured from single sheet of high-density polyethylene. Separate horizontal and vertical frame members will not be approved.
   d. Door Latching: Multipoint with a full height, spring loaded latch bar manufactured of **1/2-inch (13 mm)** thick sheet of high-density polyethylene and securely mounted on interior face of locker door. Latch bar engages door frame at a minimum of two locations per door.
   e. Hinges: Full height, continuous type, 16 gauge, A-coated steel, black finish.
   f. Handle: One piece, recessed cup formed from black HDPE and securely mounted to interior of each door for smooth operation with integral latch bar. Capable of accepting various locking mechanisms.
   g. Latching Type: Positive, automatic-type locking device allowing locker door to be locked when open, then closed without unlocking.
   h. Locking Type: **[Hasps for combination locks provided by owner] [Hasps for combination locks provided by owner] [Built-in combination] [Built-in key locks]**.
   i. Number Plates: Polished aluminum number plate with black numerals **3/8 inch (9.5 mm)** high. Attached to door with rivets.
   j. Accessories:
      1) Base: Not required.
      2) Top: 1/2-inch (13 mm) thick, continuous sloped hoods.
      3) Trim: Select from and **[filler panels] [finished end panels] [recessed trim]**.
         (a) Material: **1/2-inch (13 mm)** thick HDPE; color to match lockers.
   k. Interior Equipment:
      1) Shelf: Included.
      2) Wall Hook: Two single-prong hooks.
      3) Ceiling Hook: Not included.
      4) Coat Rod: Included.

PART 3 EXECUTION

3.01 EXAMINATION

A. Verify existing conditions and field dimensions meet manufacturer's requirements before starting work.

B. Verify prepared bases specified in Section **033000** are in correct position and configuration.

3.02 INSTALLATION

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

B. Place and secure on prepared base.

C. Install lockers plumb and square.

D. Secure lockers with anchor devices to suit substrate materials.
   1. Minimum Pullout Force: **[100 lb (445 N)] [[_____] lb ([_____] N)]**.

E. Bolt adjoining locker units together to provide rigid installation.

F. Install and **[end panels] [filler panels] [sloped tops] [miscellaneous panels] [_____]**.

3.03 ADJUSTING

A. Adjust moving parts for smooth operation.
   1. Adjust doors and latches to operate without binding.
   2. Verify latches are operating properly.
   3. Adjust built-in locks to prevent binding.

3.04 CLEANING

A. See Section **017000 - Execution and Closeout Requirements** for additional requirements.

B. Clean interior and exterior surfaces of lockers.

3.05 PROTECTION

A. Protect finishes until completion of project.

B. Touch up damaged finishes after Substantial Completion.

END OF SECTION

Spec Section: 10530

Mapes Super Lumideck Cantilever Specifications

Part 1: General

1.1 Description of Work

1. Work in this section includes furnishing and installation of extruded aluminum overhead cantilever supported canopies as manufactured by Mapes Industries Inc.
2. Related Items and Considerations
    1. Flashing of various designs may be required. Generic flashing supplied by Mapes. Specialty flashing to be supplied by installer.
    2. Determine wall construction, make-up and thickness.
    3. Ensure adequate wall condition to carry canopy loads where required.
    4. Consider water drainage away from canopy where necessary.
    5. Any necessary removal or relocation of existing structures, obstructions or materials.

1.2 Quality Assurance

1. Products meeting these specifications established standard of quality required as manufactured by Mapes Industries, Inc. Lincoln, Nebraska 1-888-273-1132.

1.3 Field Measurement

1. Confirm dimensions prior to preparation of shop drawings when possible.
2. If requested, supply manufacturer s standard literature and specifications for canopies.
3. Submit shop drawings showing structural component locations/positions, material dimensions and details of construction and assembly.

1.4 Performance Requirements

1. Canopy must conform to local building codes.
2. PE Stamped calculations are required and must be signed and sealed by an engineer licensed within the state canopy is installed.

1.5 Deliver, Storage, Handling

1. Deliver and store all canopy components in protected areas.

Part 2: Products

2.1 Manufacturer

1. Mapes Canopies
   Lincoln, Nebraska
   Phone: 1-888-273-1132.
   Fax: 1-877-455-6572.

2.2 Materials

1. Decking shall consist of 3" extruded flat soffit .078 decking.
2. Intermediate framing members shall be extruded aluminum, alloy 6063-T6, in profile and thickness shown in current Mapes brochures.
3. Cantilever supported brackets shall be standard finish.
4. Fascia shall be standard extruded 12" Smooth Face style.

2.3 Finishes

1. Finish type shall be 2-Coat Kynar Finish.

2.4 Fabrication

1. All Mapes Super Lumideck extruded aluminum canopies are shipped with the materials precut to size for field assembly.
2. All connections shall be mechanically assembled utilizing 3/16 fasteners with a minimum shear stress of 350 lb. Pre-welded or factory-welded connections are not acceptable.
3. Concealed drainage. Water shall drain from covered surfaces into intermediate trough and be directed to Rear Gutter - Leader By Others.

Part 3: Execution

3.1 Inspection

1. Confirm that surrounding area is ready for the canopy installation.
2. Installer shall confirm dimensions and elevations to be as shown on drawings provided by Mapes Industries.
3. Erection shall be performed by an approved installer and scheduled after all concrete, masonry and roofing in the area is completed

3.2 Installation

1. Installation shall be in strict accordance with manufacturer's shop drawings. Particular attention should be given to protecting the finish during handling and erection.

3.3 After installation, entire system shall be left in a clean condition.

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SECTION 105623 - WIRE STORAGE SHELVING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Coated wire ventilated shelving and accessories.
2. Adjustable shelf systems.
3. Storage accessories.
4. Installation materials.

1.2 SUBMITTALS

A. Product Data and Reports: For each type of product indicated.

1. Include construction details, material descriptions, dimensions of individual components and profiles, finishes and installation details.
2. Include rated capacities, furnished specialties and accessories.
3. Include material schedule using same scheduling sequence, format and room numbers as in Drawings.
4. Manufacturer Certificates: Signed by manufacturers certifying that they comply with requirements.

B. Samples: For each type of shelf unit and accessory with required exposed finish.

C. Maintenance Data: For coated wire ventilated shelving and accessories to include in maintenance manuals.

1.3 QUALITY ASSURANCE

A. Source Limitations: Obtain coated wire ventilated shelving and accessories through one source from a single manufacturer.

B. Fire-Test-Response Characteristics: Where indicated, provide coated wire shelving identical to those tested for fire resistance per ASTM E 119 by a testing and inspecting agency acceptable to authorities having jurisdiction.

1. Fire-Resistance Ratings: Indicated by design designations from UL's "Fire Resistance Directory" or from the listings of another testing and inspecting agency.

C. Fire-Test-Response Characteristics: Provide coated wire shelving with the following surface-burning characteristics as determined by testing identical products per ASTM E 84 by UL or another testing and inspecting agency acceptable to authorities having jurisdiction:

1. Flame-Spread Index: 25 or less.
2. Smoke-Developed Index: 450 or less.

D. Mockups: Build One (1) mockup to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution, and set quality standards for fabrication and installation.

1. Construct mockup at location determined by Construction Manager.

a. Approval of mockups is also for other material and construction qualities specifically approved by Architect in writing.
b. Approval of mockups does not constitute approval of deviations from the Contract Documents contained in mockups, unless such deviations are specifically approved by Architect in writing.

E. Preinstallation Conference: Conduct conference at Project site to comply with Project requirements.

1.4 WARRANTY

A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of shelving system that fail in materials or workmanship within specified warranty period.

1. Failures include, but are not limited to, the following:

a. Deterioration of coating, metals and other materials beyond normal use.

B. Warranty Period: One (1) year from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Coated wire shelving and accessories by Closet Maid or products with comparable materials and performance characteristics by other manufacturers are also acceptable.

2.2 COATED WIRE SHELVING AND ACCESSORIES

A. Coated Wire Shelving Systems:

1. For use at clothing closets and storage shelving.

B. Steel Wire: Basic cold drawn, Grade C-1006; average tensile strength 100,000 psi coated.

C. Wire Coating: Proprietary heavy-duty polyvinyl chloride (PVC) formula with resin, plasticizers, stabilizers, pigments and other additives.

1. Thickness: 9 to 11 mils.
2. Classification: No ingredients listed as hazardous per OSHA 29CFR1910.0017.
3. Color: White.

D. Mounting Hardware: Manufacturer's standard components for shelving installation to drywall without requiring mounting to concealed wall blocking.

1. Fasteners: Type, length and size required for installation conditions.

E. Accessories:

1. Wall and Pole Clips.
2. End and Support Brackets.
3. Poles and Standards.
4. Shelf Brackets.
5. Shelf Caps.

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates, areas and conditions for compliance with requirements for installation tolerances, and other conditions affecting performance of work.

1. Begin installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install shelving plumb and level at heights indicated in accordance with shop drawings and manufacturer's printed installation instructions.

1. Drill holes where required using sharp bit, do not punch.
2. Install wall clips, standards and brackets properly spaced and secured to substrate.
3. Install standards vertical and plumb.

B. Cut shelves to fit installation conditions. Cap exposed ends.

1. Set units level and aligned with adjacent units where required.

C. Upon completion of installation, clean all surfaces that have become soiled during installation. Remove all debris and excess materials

END OF SECTION 105623

SECTION 122413 - ROLLER WINDOW SHADES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:
   1. Motor-operated roller shades with single rollers.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: Show fabrication and installation details for roller shades, including shadeband materials, their orientation to rollers, and their seam and batten locations.

   1. Motor-Operated Shades: Include details of installation and diagrams for power, signal, and control wiring.

C. Samples: For each exposed product and for each color and texture specified.

1.3 INFORMATIONAL SUBMITTALS

A. Product certificates.

B. Product test reports.

1.4 CLOSEOUT SUBMITTALS

A. Operation and maintenance data.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: Fabricator of products.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Source Limitations: Obtain roller shades from single source from single manufacturer.

2.2 MOTOR-OPERATED, SINGLE-ROLLER SHADES

A. <Double click here to find, evaluate, and insert list of manufacturers and products.>

B. Motorized Operating System: Provide factory-assembled, shade-operator system of size and capacity and with features, characteristics, and accessories suitable for conditions indicated. Coordinate operator wiring requirements and electrical characteristics with building electrical system.

1. Electrical Components: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.
2. Electric Motor: [**Manufacturer's standard**] <**Insert description**> tubular, enclosed in roller.

    a. Electrical Characteristics: [**110-V ac**] [**220-V ac**] [**24-V dc**] [**12-V dc**] [**Solar-powered dc**] <**Insert requirements**>.
    b. Maximum Total Shade Width: [**As required to operate roller shades indicated**] <**Insert requirements**>.
    c. Maximum Shade Drop: [**As required to operate roller shades indicated**] <**Insert requirements**>.
    d. Maximum Weight Capacity: [**As required to operate roller shades indicated**] <**Insert requirements**>.

3. Remote Control: [**Keyed**] [**Individual wall-switch**] [**Group wall-switch**] [**Individual/group wall-switch**] <**Insert type**> control station.
4. Crank-Operator Override: Crank and gearbox operate shades in event of power outage or motor failure.
5. Limit Switches: Adjustable switches interlocked with motor controls and set to stop shades automatically at fully raised and fully lowered positions.

C. Rollers: Corrosion-resistant steel or extruded-aluminum tubes of diameters and wall thicknesses required to accommodate operating mechanisms and weights and widths of shadebands indicated without deflection. Provide with permanently lubricated drive-end assemblies and idle-end assemblies designed to facilitate removal of shadebands for service.

1. Roller Drive-End Location: [**Right side of interior face of shade**] [**Left side of interior face of shade**] [**As indicated on Drawings**] <**Insert requirements**>.
2. Direction of Shadeband Roll: [**Regular, from back (exterior face) of roller**] [**Reverse, from front (interior face) of roller**].

D. Mounting Hardware: Brackets or endcaps, corrosion resistant and compatible with roller assembly, operating mechanism, installation accessories, and mounting location and conditions indicated.

E. Roller-Coupling Assemblies: Coordinated with operating mechanism and designed to join up to three inline rollers that are operated by one roller drive-end assembly.

F. Shadebands:

1. Shadeband Material: [**Light-filtering fabric**] [**Light-blocking fabric**] <**Insert requirements**>.

2. Shadeband Bottom (Hem) Bar: Steel or extruded aluminum.

    a. Type: [**Enclosed in sealed pocket of shadeband material**] [**Exposed with endcaps**] [**Exposed with endcaps and integral light seal at bottom where it meets the sill**] <**Insert description**>.
    b. Color and Finish: [**As selected by Architect from manufacturer's full range**] <**Insert color and finish**>.

G. Installation Accessories:

1. Front Fascia: Aluminum extrusion that conceals front and underside of roller and operating mechanism and attaches to roller endcaps without exposed fasteners.
2. Exposed Headbox: Rectangular, extruded-aluminum enclosure including front fascia, top and back covers, endcaps, and removable bottom closure.
3. Endcap Covers: To cover exposed endcaps.
4. Recessed Shade Pocket: Rectangular, extruded-aluminum enclosure designed for recessed ceiling installation; with front, top, and back formed as one piece, end plates, and removable bottom closure panel.
5. Closure Panel and Wall Clip: Removable aluminum panel designed for installation at bottom of site-constructed ceiling recess or pocket and for snap-in attachment to wall clip without fasteners.
6. Side Channels: With light seals and designed to eliminate light gaps at sides of shades as shades are drawn down. Provide side channels with shadeband guides or other means of aligning shadebands with channels at tops.
7. Bottom (Sill) Channel or Angle: With light seals and designed to eliminate light gaps at bottoms of shades when shades are closed.
8. Installation Accessories Color and Finish: [**As selected from manufacturer's full range**] <**Insert color and finish**>.
9.

2.3 SHADEBAND MATERIALS

A. Shadeband Material Flame-Resistance Rating: Comply with [**NFPA 701**] <**Insert requirement**>. Testing by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

B. Light-Filtering Fabric: Woven fabric, stain and fade resistant.

1. Refer to Architectural Drawings for Basis of Design

2.4 ROLLER SHADE FABRICATION

A. Product Safety Standard: Fabricate roller shades to comply with WCMA A 100.1

B. Unit Sizes: Fabricate units in sizes to fill window and other openings as follows, measured at 74 deg F (23 deg C):

1. Between (Inside) Jamb Installation: Width equal to jamb-to-jamb dimension of opening in which shade is installed less 1/4 inch (6 mm) per side or 1/2-inch (13-mm) total, plus

or minus 1/8 inch (3.1 mm). Length equal to head-to-sill or -floor dimension of opening in which shade is installed less 1/4 inch (6 mm), plus or minus 1/8 inch (3.1 mm).

2. Outside of Jamb Installation: Width and length as indicated, with terminations between shades of end-to-end installations at centerlines of mullion or other defined vertical separations between openings.

C. Shadeband Fabrication: Fabricate shadebands without battens or seams to extent possible, except as follows:

1. Vertical Shades: Where width-to-length ratio of shadeband is equal to or greater than 1:4, provide battens and seams at uniform spacings along shadeband length to ensure shadeband tracking and alignment through its full range of movement without distortion of the material.
2. Skylight Shades: Provide battens and seams at uniform spacings along shadeband as required to ensure shadeband tracking and alignment through its full range of movement without distortion or sag of material.
3. Railroaded Materials: Railroad material where material roll width is less than the required width of shadeband and where indicated. Provide battens and seams as required by railroaded material to produce shadebands with full roll-width panel(s) plus, if required, one partial roll-width panel located at top of shadeband.

PART 3 - EXECUTION

3.1 ROLLER SHADE INSTALLATION

A. Install roller shades level, plumb, and aligned with adjacent units according to manufacturer's written instructions.

1. Opaque Shadebands: Located so shadeband is not closer than 2 inches (51 mm) to interior face of glass. Allow clearances for window operation hardware.

B. Electrical Connections: Connect motor-operated roller shades to building electrical system.

C. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.

D. Clean roller shade surfaces, after installation, according to manufacturer's written instructions.

E. Replace damaged roller shades that cannot be repaired, in a manner approved by Architect, before time of Substantial Completion.

END OF SECTION 122413

SECTION 123216 - MANUFACTURED PLASTIC-LAMINATE-CLAD CASEWORK

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Plastic-laminate-clad casework.
2. Casework hardware and accessories.

1.2 ACTION SUBMITTALS

A. Product Data: For each type of product.

B. Shop Drawings: For plastic-laminate-clad casework.

C. Samples: For casework and hardware finishes.

1.3 INFORMATIONAL SUBMITTALS

A. Qualification Data: For casework manufacturer and Installer.

B. Sample warranty.

C. Field quality-control reports.

1.4 CLOSEOUT SUBMITTALS

A. Quality Standard Compliance Certificates: AWI's Quality Certification Program certificates.

1.5 QUALITY ASSURANCE

A. Installer Qualifications: An authorized representative who is trained and approved by manufacturer.

1.6 WARRANTY

A. Special Warranty: Manufacturer agrees to repair or replace components of casework that fail in materials or workmanship within specified warranty period.

1. Warranty Period: Five years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 MANUFACTURERS

A. Refer To Drawings

2.2 GENERAL REQUIREMENTS FOR CASEWORK

A. Quality Standard: Unless otherwise indicated, comply with the AWI/AWMAC/WI's "Architectural Woodwork Standards" for grades of casework indicated for construction, finishes, installation, and other requirements.

1. Grade: Refer to Drawings for Basis of Design
2. Provide labels and certificates from AWI certification program indicating that casework complies with requirements of grades specified.

B. Product Designations: Drawings indicate sizes, configurations, and finish materials of manufactured plastic-laminate-clad casework by referencing designated manufacturer's catalog numbers. Other manufacturers' casework of similar sizes and door and drawer configurations, of same finish materials, and complying with the Specifications may be considered. See Section 016000 "Product Requirements."

C. Product Designations: Drawings indicate configurations of manufactured plastic-laminate-clad casework by referencing designations of Casework Design Series numbering system in the Appendix of the AWI/AWMAC/WI's "Architectural Woodwork Standards."

2.3 PLASTIC-LAMINATED-FACED CABINETS

A. Design: (Refer to drawings for basis of design) cabinet construction with the following door and drawer-front style:
1. Flush overlay.

B. Grain Direction for Wood-Grain Plastic Laminate:

1. Doors: Vertical with continuous vertical matching.
2. Drawer Fronts: [**Vertical with continuous vertical matching**] [**Horizontal**].
3. Face Frame Members: Lengthwise.
4. End Panels: Vertical.
5. Bottoms and Tops of Units: Side to side.
6. Knee Space Panels: Vertical.
7. Aprons: Horizontal.

C. Exposed Materials:

1. Plastic-Laminate Grade: Refer to Drawings for Basis of Design

a. Colors and Patterns: [**As indicated by manufacturer's designations**] [**Match Architect's samples**] As selected by Architect from manufacturer's full range <**Insert requirements**>.

2. Edgebanding: Plastic laminate matching adjacent surfaces [**PVC**].

a. PVC Edgebanding Color: Casework manufacturer's standard [**As selected by Architect from casework manufacturer's full range**] <**Insert requirements**>.

3. Solid Wood: Clear hardwood lumber of species indicated, selected for compatible grain and color.
a. Refer to Drawings as Basis of Design

D. Semiexposed Materials:

1. Plastic Laminate: [**Grade VGS**] [**Grade CLS**] unless otherwise indicated. Provide plastic laminate for semiexposed surfaces unless otherwise indicated.

a. Colors and Patterns: [**As indicated by manufacturer's designations**] As selected by Architect from manufacturer's full range <**Insert requirements**>.
b. Provide plastic laminate of same grade as exposed surfaces for interior faces of doors and drawer fronts and other locations where opposite side of component is exposed.

2. Thermoset Decorative Panels: Provide thermoset decorative panels for semiexposed surfaces unless otherwise indicated.

a. Colors and Patterns: [**As indicated by manufacturer's designations**] As selected by Architect from manufacturer's full range <**Insert requirements**>.
b. Provide plastic laminate of same grade as exposed surfaces for interior faces of doors and drawer fronts and other locations where opposite side of component is exposed.

3. Hardboard: Use only for cabinet backs where exterior side of back is not exposed.
4. Metal for Steel Drawer Pans: Cold-rolled, carbon-steel sheet complying with ASTM A1008/A1008M; matte finish; suitable for exposed applications.
5. Unless otherwise indicated, provide specified edgebanding on all semiexposed edges.

E. Concealed Materials:

1. Solid Wood: With no defects affecting strength or utility.
2. Plywood: Hardwood plywood.
3. Plastic Laminate: Grade BKL.
4. Particleboard.
5. MDF.
6. Hardboard.

2.4 MATERIALS

A. <Double click to insert sustainable design text for composite wood products.>

B. Maximum Moisture Content for Lumber: 7 percent for hardwood and 12 percent for softwood.

C. Hardwood Plywood: HPVA HP-1, particleboard core except where veneer core is indicated.

D. Softwood Plywood: DOC PS 1.

E. Particleboard: ANSI A208.1, Grade M-2.

1. <Double click to insert sustainable design text for recycled content.>

F. MDF: Medium-density fiberboard, ANSI A208.2, [**Grade 130**] <**Insert grade**>.

1. <Double click to insert sustainable design text for recycled content.>

G. Hardboard: ANSI A135.4, Class 1 tempered.

1. <Double click to insert sustainable design text for recycled content.>

H. Plastic Laminate: High-pressure decorative laminate complying with NEMA LD 3.

1. <Double click here to find, evaluate, and insert list of manufacturers and products.>

I. PVC Edgebanding for Plastic Laminate: Rigid PVC extrusions, through color with satin finish, 3.0 mm thick at doors and drawer fronts, 1.0 mm thick elsewhere.

J. Thermoset Decorative Panels: Particleboard or MDF 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.

1. Edgebanding for Thermoset Decorative Panels: PVC or polyester edgebanding matching thermoset decorative panels.

K. Glass for Glazed Doors: Clear float glass complying with ASTM C1036, Type I, Class 1, Quality-Q3; not less than [**3.0 mm**] [**4.0 mm**] [**5.0 mm**] [**6.0 mm**] thick.

L. Glass for Glazed Doors: Clear tempered glass complying with ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality-Q3; not less than 5.0 mm thick.

M. Glass for Glazed Doors: Clear laminated annealed glass complying with ASTM C1172, Kind LA, Condition A, Type I, Class I, Quality-Q3; with two plies not less than 3.0 mm thick and with clear, polyvinyl butyral interlayer.

N. <Double click to insert sustainable design text for adhesives.>

2.5 CASEWORK HARDWARE AND ACCESSORIES

A. Hardware, General: Unless otherwise indicated, provide manufacturer's standard satin-finish [**mirror polished-finish**] [**powder-coated**], commercial-quality, heavy-duty hardware.

1. Use threaded metal or plastic inserts with machine screws for fastening to particleboard except where hardware is through-bolted from back side.

B. Butt Hinges: Stainless steel, semiconcealed, five-knuckle hinges complying with ANSI/BHMA A156.9, Grade 1, with antifriction bearings and rounded tips.

C. Frameless Concealed Hinges (European Type): ANSI/BHMA A156.9, Type B01602, self-closing.

D. Wire Pulls: Solid [**nylon**] [**aluminum**] stainless steel [**or**] [**chrome-plated brass**] wire pulls, fastened from back with two screws.

E. Semirecessed Pulls: Plastic. For sliding doors, provide recessed plastic flush-pulls.

F. Door and Drawer Bumpers: Self-adhering, clear silicone rubber.

G. Drawer Slides: ANSI/BHMA A156.9, Type B05091.

H. Drawer and Hinged-Door Locks: Cylindrical (cam) [**Mortise**] type, five-pin tumbler, brass with chrome-plated finish, and complying with ANSI/BHMA A156.11, Grade 1.

1. Provide a minimum of two keys per lock and six master keys.
2. Provide locks [**where indicated**] [**on every door and drawer**].

a. Masterkey for up to [**500**] <**Insert number**> key changes.

I. Sliding-Door Hardware Sets: Manufacturer's standard, to suit type and size of sliding-door unit.

J. Adjustable Shelf Supports: Two-pin-locking plastic shelf rests complying with ANSI/BHMA A156.9, Type B04013 [**Single-pin metal shelf rests complying with ANSI/BHMA A156.9, Type B04013**].

K. Adjustable Shelf Supports: Mortise-type, zinc-plated [**powder-coated**] steel standards and shelf rests complying with ANSI/BHMA A156.9, Type B04071 and Type B04091.

PART 3 - EXECUTION

3.1 INSTALLATION

A. Grade: Install casework to comply with same quality standard grade as item to be installed.

B. Install casework level, plumb, and true in line; shim as required using concealed shims. Where casework abuts other finished work, apply filler strips and scribe for accurate fit, with fasteners concealed where practical.

C. Base Cabinets: Set cabinets straight, level, and plumb. Adjust subtops within 1/16 inch (1.5 mm) of a single plane. Align similar adjoining doors and drawers to a tolerance of 1/16 inch (1.5 mm). Bolt adjacent cabinets together with joints flush, tight, and uniform.

D. Wall Cabinets: Hang cabinets straight, level, and plumb. Adjust fronts and bottoms within 1/16 inch (1.5 mm) of a single plane. Fasten cabinets to hanging strips, masonry, framing, wood blocking, or reinforcements in walls and partitions. Align similar adjoining doors to a tolerance of 1/16 inch (1.5 mm).

E. Fasten casework to adjacent units and to masonry, framing, wood blocking, or reinforcements in walls and partitions to comply with the AWI/AWMAC/WI's "Architectural Woodwork Standards."

F. Install hardware uniformly and precisely. Set hinges snug and flat in mortises unless otherwise indicated. Adjust and align hardware so moving parts operate freely and contact points meet accurately. Allow for final adjustment after installation.

G. Adjust operating hardware so doors and drawers operate smoothly without warp or bind. Lubricate operating hardware as recommended by manufacturer.

H. Clean finished surfaces, touch up as required, and remove or refinish damaged or soiled areas to match original factory finish, as approved by Architect.

END OF SECTION 123216

OhioCAT - Cat Compact Miamisburg Material Standards

09.24.2026

Product	Product Location	Basis of Design Manufacturer	Style/Model	Color/Finish	Notes
Acoustical Tile Ceilings	Interior, Per Drawings	USG	Tile: Radar; 24 x 24; SQ Grid: DX	White	
Carpet Tiles	Offices	Interface	Cubic	Construction	
Ceramic Tiling	Walls	Daltile	12 x 24 Colorbody Porcelain Fabrique	Gris Linen	
Ceramic Tiling	Backsplash	American Olean	Color Story Wall	Dependable 0053 (2)	
Ceramic Tiling	Floor	Crossbill Tile	Basalt	Bed Rock	
Door Hardware (Glass Partition Doors)	Interior Offices	IVES	PR-9266 36"	Brushed Nickel	Interchangable Cores
Door Hardware (locks)	Varies	Schlage	Level Style: Athens	Brushed Nickel	Interchangable Cores
Entrance Floor Mats and Frames	Vestibule	Roppe	Rop-Cord Recycled Rubber Tile	12 x 12, Earthtone	
Fiberglass Reinforced Plastic Doors and Frames	Exterior	Edgewater Door		Dark Grey - 028 (Match Dovetail)	Insulated
Fire Extinguishers					Per Drawings
Fire Protection Cabinets			Semi-recessed, glass door	Prefinished White	Provide Perimeter Trim.
Flush Wood Doors	Interior	VT Industries	Plain sliced Select White birch	Finish: AWI TR6: 600 Color: Alpine, AL18	Coordinate Lites with Door Type Schedule
Glazing: Aluminum Windows - Interior	Interior	Kawneer	450 Series	Bone White	
Glazing: Aluminum-Framed Storefronts and Entrances	Exterior, Varies	Kawneer	451UT	Charcoal/Sandstone per drawings (Kynar or equal Finish)	451T Allowable pending lead times.
Glazing: Glass Partitions - Interior	Offices, Conference	-	1/2" Clear Tempered, Aluminum Track	Satin/Brushed Aluminum	Refer to elevations for Decals
Hollow Metal Doors	Interior	Sherwin-Williams		Dovetail SW 7018	
Hollow Metal Frames	Exterior/Interior	Sherwin-Williams		Dovetail SW 7018	
Interior Abuse Panels	Parts and Shop Walls	-	Corugated Aluminum Panels	Paint to Match Walls	
Plastic Laminate Faced Architectural Cabinets	Cabinets	Wilsonart	Smooth	Asian Knight 7949	Soft close slides and SS bar pulls
Plastic Laminate-Clad Countertops	Countertops	Wilsonart	Smooth	White Tigris 4783	
Plastic Toilet Compartments	Bathroom partitions	ASI	Solid plastic HDPE Ceiling Mounted	Charcoal - 9237	
Resilient Sheet Flooring	Bathrooms and Locker Rooms	Mannington	Biospec MD	Flint	Integral Base
Resilient Wall Base and Accessories	Carpet Offices and Concrete Floors	Tarkett (Johnsonite)	4" thermoplastic vinyl	Grizzly	
Resin Lockers	Locker Rooms	ASI	Single Tier 15W 18D 60H	Charcoal - 9237	
Roller Window Shades	Windows	MechoShade Systems, Inc.	Office windows - Manual; exposed headbox Public and Conference - Powered, exposed head box	Light-filtering wove fabric; Basketweave; Silver birch; 5% open	
Sold Surfacing	Countertops	Corian		Savannah	Break Rooms, lavitories
Sold Surfacing	Window sills	Corian		Canvas	All Windows
SS Accent Diamond Plate Wainscotting	Parts and Service Desks	DiamondLife	Anodized Aluminum Diamond Plate	Platinum Ice	
SS Corner Guards	Wall Corners	-	Type 430 16-gauge 6'-0" High, 3.5" Return	Stainless steel, brushed	All Open Gypsum Wall Outside Corners
SS Countertops	Countertops			Stainless steel, brushed	Parts and Service Desk surface and base, corner guards, Ztech Room counter, Internal Parts Counter, Wil Call counter
Stair Coverings	Stair Treads	Roppe	Rubber, hammered texture	Select From Standard Finishes	
Wash Bay PVC Panels	WashBay (Wash Area)	Duramax	Flat - Smooth	White	Interlocking
Interior Painting	Walls	Sherwin-Williams	ProMar Zero VOC	SW 7009 Pearly White	
	Ceilings			SW 7007 Ceiling Bright White	
	Ceilings - Retail			SW7075 Web Gray	
	Crane Rails			Match crane bridge safety yellow	
	Accent Red (Fire Extingusher Locations)			SW 6868 Real Red	Bottom of steel columns 8'-0"
	Shop walls (up to 8'-0")			SW7075 Web Gray	
	Shop walls (above 8'-0")			SW 7007 Ceiling Bright White	
Toilet, Bath, and Laundry Accessories	Mirrors	ASI	10-0620 (Size per Drawings)	Stainless Steel	Provided by GC
	Grab bars		10-3401 (Size per Drawings)		
	Sanitary Waste Disposal		10-0473-A		
	Utility Hooks (Janitors)		10-1315-6		
	Robe hooks		10-7340-S		
	Paper towel dispenser	Georgia Pacific	Model # 54338 Universal, Hardwound, Manual, Paper Towel Dispenser	Smoke	Furnished by Owner, Installed by Contractor
	Toilet paper dispenser	Georgia Pacific	Model # 56796A Compact Coreless Toilet Paper Dispenser	Stainless steel	
	Soap dispenser	GoJo	Model # 5271-06 GOJO Hygiene Series, 2000mL, Manual, Foam, Gel, Liquid, Wall	Black	
Residential Appliances	Refrigerator/Freezer	LG		Stainless steel	
	Coffee Machine	Keurig	k-3550		Provide Water Supply
	Ice and Water Dispensor	Follett	Champion 7 Ice and Water		Provide Water Supply
	Microwave	LG		Stainless Steel	
Plumbing Fixtures (Per Drawings)	Water closets (tank type, floor mounted)	American Standard	Cadet 2467	White	
	Water closets (flush valve, wall mounted)	American Standard	Afwall	White	
	Water closets (flush valve, floor mounted)	American Standard	Madera	White	
	Urinals	American Standard	Allbrook 6541	White	
	Lavatories (wall mounted)	American Standard	Lucerne 0356	White	
	Lavatory (undercounter)	American Standard	Ovalyn 0497	White	
	Single bowl sink	Elkay	Lusterstone 16x16	Stainless steel	
	Multi-bowl sink	Elkay	EWMA(Size and Faucets per drawings)	Stainless steel - Wall Hung	Shop and Locker Rooms
	Mop basins	Fiat	MSB2424; 24x24x10		
	Electric water cooler	Oasis	PG8EBFSL-SS		